JAN 27 1944

ENGINEERING
NEWS-RECORD

DECEMBER 30, 1943

WITH ENGINEERS ON FAR-FLUNG FRONTS

The demands of global warfare have given American construction men an unusual range of activity, two aspects of which are featured in this issue by *News-Record* editors who recently returned from foreign assignments.

* * *

Engineers in the Battle of Attu

By HAROLD W. RICHARDSON . . . is an account of the men who are ready to fight or to build, and who did both in one of the toughest and bloodiest battles of the war. In taking possession of Attu, the Army Engineers were called upon to construct roads and handle supplies, and finally they went into combat to turn back a vicious Jap counter-attack.

'Way Down the Rio Doce Valley

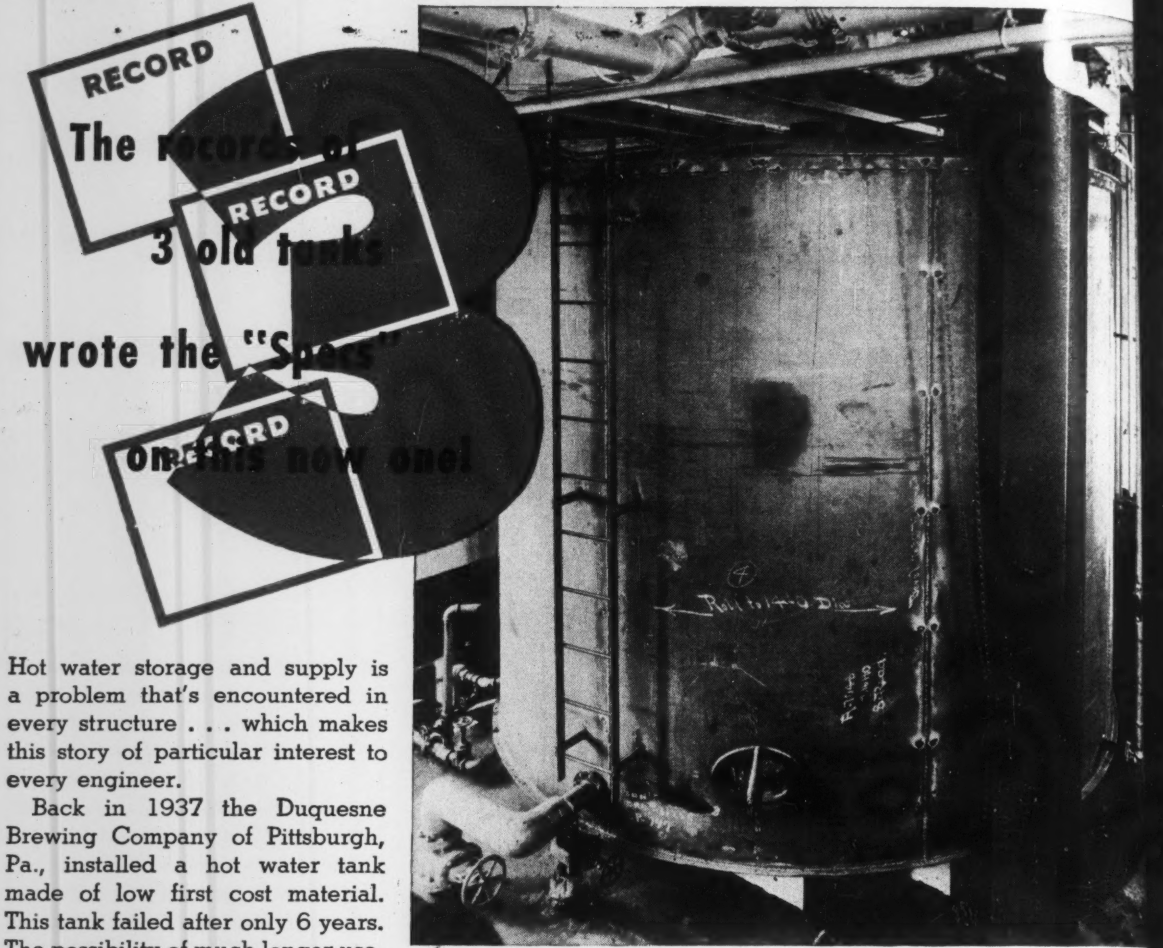
By EDWARD J. CLEARY . . . has for its locale a project far from the sound of enemy guns, but on whose successful prosecution depends in part how soon these guns will be silenced. In the heart of Brazil North Americans are building rail, port and mining facilities to speed the movement of iron ore into Allied weapons of victory.

ALSO IN THIS ISSUE

High Stressed Wire in Concrete Tanks

Problems Discussed by Highway Engineers

BYERS WROUGHT IRO



The records of 3 old tanks wrote the "Specs" on this new one!

Hot water storage and supply is a problem that's encountered in every structure . . . which makes this story of particular interest to every engineer.

Back in 1937 the Duquesne Brewing Company of Pittsburgh, Pa., installed a hot water tank made of low first cost material. This tank failed after only 6 years. The possibility of much longer useful life from wrought iron was suggested by the fact that two wrought iron tanks, also built in 1937 for severe corrosive service, were still on the job. After investigation, the engineers built the new hot water tank of Byers Wrought Iron. The company is also installing wrought iron for all piping in new construction and for maintenance, and has used several thousand pounds in hoops for wooden tanks.

Water varies so widely in its corrosive characteristics that the only safe guide in specification is actual experience under field conditions. Even though you may not have personal knowledge of the performance of wrought iron in any specific application, you can still make your selection on this basis, for our Engineering Service Department will give you service records received from other engineers.

The excellent results obtained from wrought iron in corrosive services stem directly from its two-component structure. Tiny fibers of glass-like silica slag are threaded through the high-purity iron matrix. Corrosive attack is continuous retarded and diffused. In additio the initial protective film is firm anchored in place, which helps shield the underlying metal.

You will find some interestin and helpful information in o bulletin, "Wrought Iron for Ta Construction." May we send yo a copy?

A. M. Byers Company. Established 1864. Offices in Pittsburg Boston, New York, Philadelphi Washington, Chicago, St. Lou Houston, Seattle, San Francisc

Corrosion costs you more than Wrought Iron

BYERS
GENUINE WROUGHT IRON
TUBULAR AND HOT ROLLED PRODUCTS
ELECTRIC FURNACE ALLOY STEELS • OPEN HEARTH ALLOY STEELS
CARBON STEEL TUBULAR PRODUCTS

SCRAP needed! Iron and steel scrap may set steel production limits. [illegible] the gap. Current collections aren't enough. It is everybody's business. Please help.

ENGINEERING NEWS-RECORD

oted to Buildings, Sewers, Waterworks, Bridges, Roads, Dams, Foundations, Earthwork, Flood Control, Public Works, Shipbuilding, Irrigation, Canals, Railroads

McGRAW-HILL PUBLISHING COMPANY, INC.

blication Office: 99-129 North Broadway, Albany 1, N. Y. • Editorial and Executive Offices: 330 West 42nd Street, New York 18

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WALDO G. BOWMAN, *Editor* **ALBERT E. PAXTON, *Manager***

l. 131 DECEMBER 30, 1943 No. 27

OMING NEXT

One of the outstanding bridge con-
ruction achievements of all time
s that of the Peace River crossing
the Alcan Highway. Just eight
onths after the contractors were
ven notice to proceed, traffic was
oving over this 2,130-ft. structure—
suspension type with a 930-ft. main
an, and accommodating a 24-ft.
dway. In this period all parts of
e bridge were detailed, manufac-
red, shipped 3,000 miles to the site
d erected. The project will be
scribed in the Jan. 13 issue.

For too long a time the problem of
bris in flood control reservoirs has
en misunderstood by engineers and
ssively accepted in an attitude of
nconditional surrender." The Los
ngeles County Flood Control Board
s made a long term study of this
oblem and reached some conclu-
ns of vital importance to the engi-
ering profession. The result of
ese studies will be published in
VR for Jan. 13.

Looking to postwar construction at
attle, Wash., plans were drawn for
water transmission line of 6½-ft.
a. to last 100 years or more. When
e designs were passed around for
iticism, up and down the Pacific
oast, various views on long-life de-
gn were brought to light. The
oughts generated by this unique
pproach to a postwar problem will
e summarized with concluding com-
ent by the originator of the design
the Jan. 13 issue.

THE HIGHWAY NUMBER

Postwar highway plans will be the
ajor theme of the Annual Highway
umber, Jan. 27. Included will be a
mmary of the views of leading men
the highway field as to the amount
work to be included in the post-
ar highway construction program,
so some typical examples of what
e states are doing in preparation
r their postwar operations, and
her information of vital concern to
gineers, contractors and highway
icials throughout the country.

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Number of copies of this issue printed: 36,010

DO YOU WANT AN INDEX?

Due to the paper shortage, no index for the current volume (July-December, 1943) will be issued except to subscribers who ask for it. If you want a copy of the index please send in the coupon below.

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Street ....
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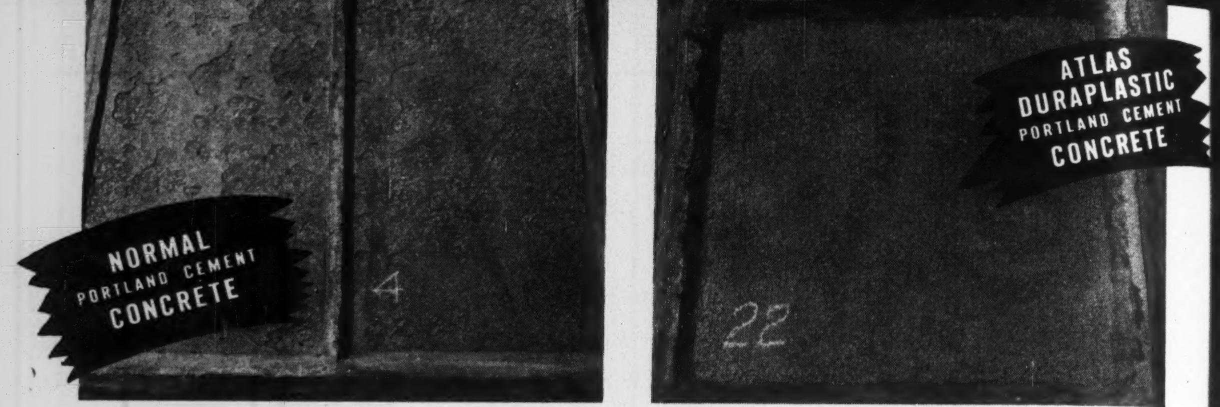
Pavement Scaling Solved



Sections from Universal Atlas original test road after 60 cycles of salt de-icing treatment.

Concrete made with Atlas DURAPLASTIC air-entraining portland cement resists freezing, thawing, and salt de-icing treatment as demonstrated by tests and proved by street and highway installations

These photographs of sections from the Universal Atlas original test road, built in 1938 at its Hudson, N. Y., plant, show the results of 60 cycles of freezing, thawing, and heavy salt de-icing applications—the equivalent of many winters of actual service. Note the condition of the standard cement section (left), while the DURAPLASTIC section (right) is 97% scale-free.

The results of this test road and this discovery by Universal Atlas have been substantiated on more than a score of street and highway installations in over a dozen states. Many of these have been through three or four winters, and all are scale-free. No oil or other protective surface treatment has been employed. In some of these areas, air-entraining portland cement is now the required standard for such street and highway work.

Atlas DURAPLASTIC is a true portland cement in which a small, precise quantity of the air-entraining material has been interground during manufacture in accordance with current Federal and ASTM specifications. In addition to all the properties which have made portland cement the favorite paving material, DURAPLASTIC has the added advantages of improved workability and greater durability.

Our Technical Service Bureau will provide detailed information on DURAPLASTIC—the cement that makes concrete scale-resistant. Write today. Ask for a copy of "Pavement Scaling Successfully Checked." Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Building, New York 17, N. Y.

OFFICES: New York, Chicago, Albany, Boston, Philadelphia, Pittsburgh, Minneapolis, Duluth, Cleveland, St. Louis, Kansas City, Des Moines, Birmingham, Waco.

QUICK FACTS about Atlas DURAPLASTIC* cement

1. **Complies** with current Federal and ASTM specifications.
2. **Renders** concrete pavements highly resistant to scaling due to the action of salts used for ice removal.
3. **Protects** concrete against the effects of freezing and thawing weather.
4. **Minimizes** segregation and bleeding. Concrete is more uniform throughout and more durable.
5. **Permits** earlier finishing.
6. **Requires** no additional materials at the mixer.
7. **Called *DURAPLASTIC*** because it makes concrete more *durable* and more *plastic*.

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ENR-D-3

ATLAS DURAPLASTIC CEMENT

A Universal Atlas Product

he Week In Engineering and Construction

GINEERING NEWS-RECORD • DECEMBER 30, 1943 • VOLUME 131 • NUMBER 27

onstruction labor available or pool of skilled workers

airman Paul V. McNutt of the War Manpower Comssion, reappraising requirements, estimates a total labor rce of 66 million by middle of 1944

he release of more than 600,000 conction workers between September, 3, and July, 1944, will provide a valu- pool of skilled labor, according to War Manpower Commission, which announced a reappraisal of manpower uirement estimates, the report indicat- a total labor force of 66,300,000 by t July. This number, an increase of 0,000 over July, 1943, and will be by the largest ever mobilized into produc- employment or military service in country.

eappraisal of estimates was desirable, McNutt said, in view of these two elopments:

1) Employment of non-war activities, h as trades and services, is not declin- as predicted.

2) Changed estimates by the War duction Board indicate that munitions enditures during the calendar year 4 are not expected to exceed $76,700,-,000, whereas the War Manpower nmission's estimate for munitions intries, announced last June 28, was ed upon an earlier War Production rd production schedule totaling ,400,000,000 for 1944.

Munitions work keeps up

 is now expected that munitions emyment will increase only to 10,700,000, ead of 11,600,000, as estimated in e. Employment in trades and services decline only slightly from 10,600,000 10,500,000, instead of to 9,900,000. ployment in the federal war agencies remain constant at 1,600,000, instead ncreasing to 2,000,000. A few other significant revisions have also been de in estimates.

r. McNutt said he considered expan- of the total labor force to 66,300,000 ible. The increase in the labor force to population growth should provide roximately 500,000 above and beyond nal losses from death, disability and ement, he pointed out. The remaining 1,000,000 must be new workers, primarily women.

"The total of 10,700,000 workers which will be needed in the munitions industries represent an increase of 1,400,000 over the July, 1943, level and one million over September, 1943," Mr. McNutt said.

"The net strength of the armed services is expected to rise to 11,300,000—two million over July, 1943, and 1,700,000 over September, 1943. Actual withdrawals will be considerably higher, since losses resulting from casualties and discharges must be compensated; however, some of the discharged men and women will return to the civilian labor force.

"Employment in non-war manufacturing and in trades and services will not fall off to any significant extent. Therefore, we cannot anticipate a large volume of transfers out of less-essential activities in the absence of effective measures to bring this about."

◆

The Contract Termination Branch and the Redistribution and Salvage Branch of the Army Services Forces have been brought together into a new division which will handle both contracts and surplus equipment. It will be known as the Readjustment Division, headed by Col. D. N. Hauseman, of the Ordnance Department.

Photo by The Indianapolis Star.

Indiana's new Stream Pollution Control Board

Abatement of obnoxious pollution in Indiana's streams and waterways, both now and after the war, will receive the serious attention of this Stream Pollution Control Board, recently appointed under the Indiana Stream Pollution Law which was re-enacted in 1943 by legislative action. Board members, standing left to right are: Leo Besozzi, consulting engineer, Hammond; George C. Hillenbrand, Batesville; Joseph L. Quinn, technical secretary; Cecil K. Calvert, bacteriologist, Indianapolis; and Hugh J. Barnhart, director, State Department of Conservation, ex-officio member. Shown seated are Charles M. Dawson, lieutenant governor, member ex-officio (left) and Governor Henry F. Schricker.

Deficiency bill provides housing funds but denies FWA requests

President signs measure appropriating $50 million for NHA, $800 thousand for Reclamation Bureau surveys, and other amounts for federal works, Navy engineering and Mississippi River flood control

On Dec. 23, President Roosevelt signed H.R.3598, the first supplemental national defense appropriation act of 1944, which includes numerous allotments for public work planning and construction. Some allotments are to supply deficiencies; others are supplemental to existing appropriations, or supply funds already authorized but not appropriated.

The largest of these, amounting to $50 million, is additional money for the National Housing Agency for war housing. Although the Federal Public Housing Authority has not yet announced how the amount will be divided, it is expected that while much will go for new public housing, some will be for conversions. NHA had asked for $200 million.

The Federal Works Agency, however, did not fare well. An earlier authorization of $50 million for FWA's war public works and community facilities program, although included in the bill by Senate amendment, was stricken out entirely by the conference committee. Those funds were to be used to build schools, waterworks, hospitals, and similar projects to supplement housing facilities that will be built by NHA with its $50 million fund. According to a spokesman for FWA, its funds for this purpose are about exhausted, and it is looking to Congress to appropriate the money it needs during the coming second session. The FWA also failed to get $9 million, which the Senate had inserted for work relief in Puerto Rico.

Aeronautic construction

The National Advisory Committee for Aeronautics got the following additional appropriations for construction and building equipment, the amounts to be available until expended: Langley Field, Va., $8,804,200; Ames Aeronautical Laboratory, Moffett Field, Calif., $2,249,100; and Aircraft Engine Research Laboratory, Cleveland, Ohio, $3,936,000.

The Department of Agriculture received $6½ million in addition to the $20 million provided by the Department of Agriculture Appropriation act of 1944.

The $60 million limitation on the Reconstruction Finance Corp. to make advances was increased to $67½ million. Earlier in the career of the bill the amount stood at $97½ million.

The Office of Administrator of Civil Aeronautics was granted $9,907,890 "for construction, building, completion, and development of landing areas and public airports, subject to the approval of the War Manpower Commission as to the availability of manpower . . . including construction previously undertaken by the Works Projects Administration, and for all necessary engineering and administrative expenses in the field."

For reclamation surveys

The Bureau of Reclamation received $800,000 for surveys, plans and specifications for water conservation and utility projects. This amount is included in a million dollars of additional funds appropriated for such projects.

Two grants were made for Alaska roads, including $300,000 additional for the construction, repair and maintenance of roads, tramways, ferries, bridges and trails for the fiscal year 1944, and $500,000 for continuation of construction on the Richardson Highway.

Mississippi flood control

The Corps of Engineers is to receive $5 million for flood control on the Mississippi River and its tributaries, and $3 million for emergency flood control on tributaries of the Mississippi, both funds to remain available until expended. An additional $170,000 is appropriated for the enlargement of the turning basin at Lorain, Ohio, subject to the approval of the Chief of Engineers, and $303,500 for reimbursement for damages on the Illinois River in Illinois.

Audited claims include three separate engineering items for the Navy, totalling $161,000. Provision is made also for payment of full wages to employees of contractors with the United States who are taken prisoners of war, 70 per cent to be paid to their dependents. The Treasury Procurement Division was granted $3 million for its Federal Property Utilization branch, charged with the disposal of certain government surpluses, including construction equipment formerly owned by WPA and CCC.

• • •

Maximum prices set for construction machinery

The Office of Price Administration has issued a revised printing of MPR 136, concerning maximum prices for construction and other machines and parts and machinery services, in which all of the 53 amendments made since the last compilation have been gathered together. recent of these is Amendment 106, w became effective Dec. 1, but which vides for no radical changes.

An illustrative list of products covered by the regulation, including h and carpenter's tools, is also included is a table of depreciation rates for termining prices for used equipm Comprehensive lists of products cove and an adequate index are also a par the compilation.

• • •

Dutch sanitarian sends greetings to U. S. frien

Dr. N. Kessener, director of the reau of sewage and waste treatmen The Hague, Holland has through Red Cross sent a message of good wi to his friends in the United States sa that he "is as well as circumstances mit but that sewage treatment deve ments in Holland are handicapped the existing conditions." Dr. Kesse has made many contributions to sew treatment practice, particularly in reg to aeration.

The message was sent to Dr. Wil Rudolfs, chief of the department water and sewage research, New Je Agricultural Experiment Station, a c friend of Dr. Kessener. It took m than eight months to transmit the m sage, which was sent on April 3 reached here December 16.

• • •

C. E. Lott, contractor, dies at Pittsburgh

Clarence E. Lott, for 15 years pr dent of the John F. Casey Co., Pi burgh contracting firm, died in Pittsbu Dec. 18. He was born Apr. 1, 1885, Harley, Ont., and received his early e cation at Detroit. At the age of 19 entered the employ of John F. Casey a carpenter helper, working up to position of president in 1928.

A prominent contractor for many ye Mr. Lott was a director of the Associ General Contractors of America, one of the founders of the Construc Association of Western Pennsylva serving as its first president. He wa director of the Swindell-Dressler Co Railway Maintenance Corp., Tin Products Co., New Castle Refracto Co., Commonwealth Trust Co. and Dollar Savings Bank in Pittsburgh.

Under Mr. Lott's leadership the J F. Casey Co. built the American Bri Co. shipyards, the open hearth fou tions for Carnegie-Illinois at Homest water filtration plants for Pittsbur Cleveland and Columbus, extensive st tures for the Pennsylvania R.R., and merous public improvements.

ittle Big Inch" pipeline nearly finished

roleum Administrator for War, Har-. Ickes, has announced that despite eaks thus far in the Western leg of Little Big Inch" pipeline, operations the 20-inch line which runs 1,475 from the Texas gulf to New York r, are expected to begin sometime the first of the year with first ship-s of oil.

lding of the final joint took place 8, near Crooksville, Ohio, and the rn leg of the line has recently been rgoing high pressure tests.

other slight transportation loss in Big Inch" line occurred recently be- of the blowing of three gaskets h necessitated a 19-hour shut-down of line. Since repairs, which were ly made, the "Big Inch" line has operating close to capacity.

U. S. buys 10,575 acres for North Carolina dam

The Federal Works Agency is proceeding with two sets of plans and specifications for a dam in connection with the High Point, N. C., hydro-electric development—one to be used for wartime construction, and the other to be used if the project is postponed until after the war.

Ward D. Carpenter, project engineer for the Federal Works Agency, announced recently that the federal government has contracted for 10,575 acres of land for the project. This is more than half of the estimated 20,000 acres that will be needed for the reservoir area.

The date when construction can be started on the project, located at Styers Ferry on the Uadkin River, remains indefinite, the War Production Board not having released necessary critical materials.

ncrete power house dominates plant king synthetic rubber ingredients

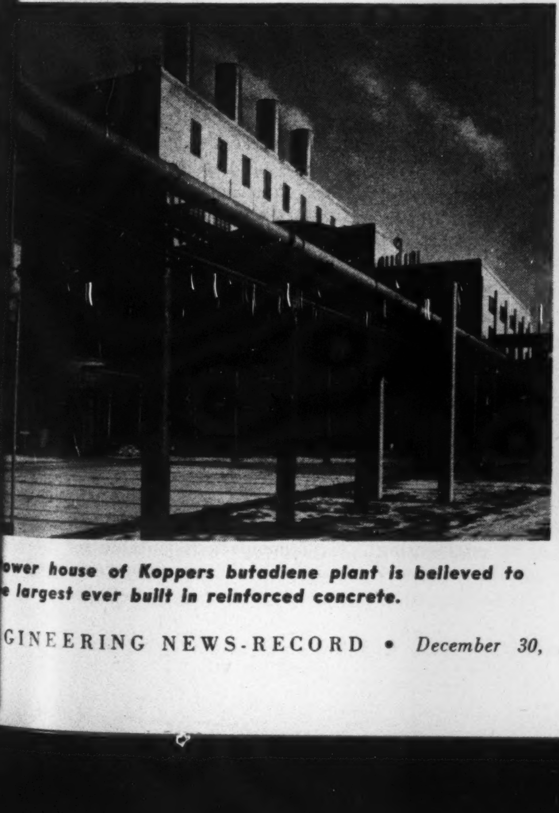
cause large quantities of steam and nsiderable block of power are re-d to make the materials butadiene styrene whose combination (poly-zation) results in synthetic rubber, wer house is one of the key ele-s in the plants that are making these ingredients. The one pictured w (left) is at the new Kobuta plant he Koppers Co. on the Ohio River miles from Pittsburgh, where a cele-ion was held, Dec. 17, to mark the inment, after only four months of ation, of a production rate of 168 ent of designed capacity. Planned to furnish about one-seventh of the nation's requirements in butadiene and styrene, the plant is thus greatly exceeding expectations; Bradley Dewey, national rubber director, said it represents one of the outstanding plants in the rubber program, and was approaching the status of a "miracle" job.

Steam requires water, and the picture at the right shows the pump room in the Ohio River intake structure, where six 20,000-gpm. centrifugals supply more water than is consumed by the City of Pittsburgh. The heavy cylinders on the discharge of the pumps are special filters to reduce the turbidity of the water.

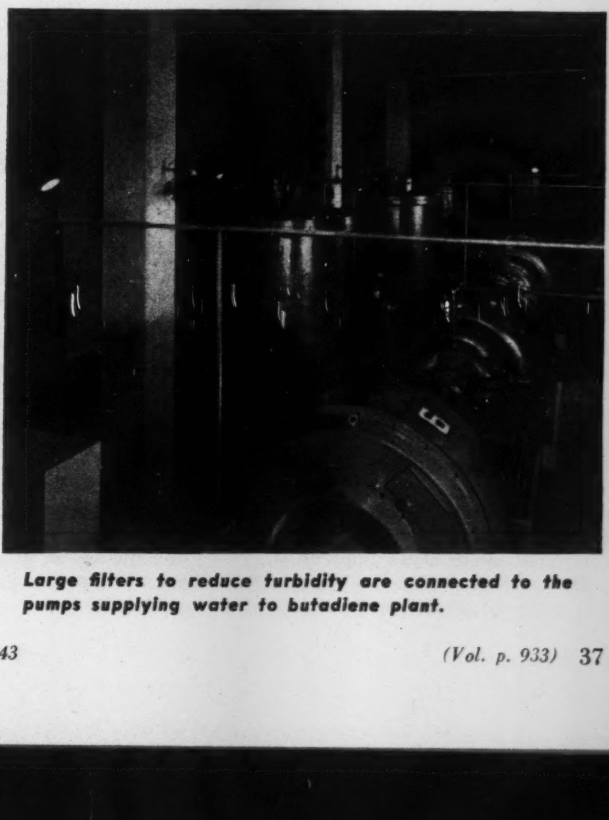
Although a butadiene and styrene plant requires huge tonnages of steel in the form of tanks, piping, boilers, pumps and valves, substantial conservation of this metal was attained at Kobuta by building all the auxiliary structures of brick, wood and reinforced concrete. A total of 100,000 cu. yd. of concrete was used in the various facilities, such as the power house, water intake and the miles of pipe support bents and towers. The power house itself required 30,000 cu. yd. in framing, walls and roof. One of its most striking features is a battery of nine suspended coal bunkers of reinforced concrete, each having dimensions of 30x22x30 ft. and a capacity of 280 tons of coal. Large columns characterize the power house framing, while the roof over the turbine room is a concrete tied arch of 85-ft. span.

Statistics, that give some measure of the size of the plant include: butadiene capacity, 80,000 tons a year; styrene capacity, 37,000 tons a year; plant site, 200 acres; railroad construction, 12 miles by the Pennsylvania R. R. and 4 miles by the Pittsburgh & Lake Erie; construction workers, 6,500; plant operating personnel, 1,000; steam, 1,000,000 lb. per hour; power, 35,000 kw.; grain alcohol to make butadiene, 80 to 100 million gal. per year; benzine to make styrene, 12 million gal. per year; and a FPHA housing project of 300 units.

The plant was built by the Koppers Co. Engineering and Construction Division for the Defense Plant Corp., and is operated by Koppers United Co., Butadiene Division, under contract with the Rubber Reserve Co. The power plant was designed by Gibbs & Hill of New York, and the water intake by Morris Knowles, Inc., of Pittsburgh.



ower house of Koppers butadiene plant is believed to e largest ever built in reinforced concrete.



Large filters to reduce turbidity are connected to the pumps supplying water to butadiene plant.

Engineering and construction activity in Mexico

Margarito Ramirez, general manager of the Mexican National Railways, says the government has spent $10,000,000 on improving that country's railways during the past three years, but says it will be a long time before the deteriorated lines will be in first-class condition.

The government-owned lines are having their best year since 1909, hauling 100 percent more freight than for any year since 1939. Previous to the improvement program started in 1940, many of the roadbeds had not been repaired for 30 years. Some are still unrepaired, but work is proceeding, guided by a survey made by a United States railroad mission headed by Oliver Stevens.

The National Railways will establish a central passenger and freight depot in Mexico City at an estimated cost of $12,500,000. Company engineers have been assigned to find a suitable site and draft plans. Of the cost, some $10 million is expected to be raised by selling at auction the company's existing stations and freight depots in Mexico City. Means for raising the rest are being worked out by Ramirez and Ramon Beteta, chairman of the board and subsecretary of finance. Work is expected to start during the winter, according to the present plan.

Rehabilitation of the United Railways of Yucatan along lines similar to the work now being done for the National Railways by the American commission, has been decided upon by the state government, says Manager Manuel Mier y Teran. Engineers have been assigned to draft the rehabilitation program and estimate cost. It is reported that the American rail commission will participate in this rehabilitation.

The Jalisco state government has obtained a $1,000,000 loan from the National Urbanization and Public Works Bank to finance completion of various roads, including that from Guadalajara to Barra de Navitad, which will be part of the Mexican transcontinental highway from Tampico to the Pacific Coast.

Prompt deliveries from the United States of machinery and materials have speeded port construction at Manzanillo and the start of like operations at Mazatlan, both Pacific ports, and at Vera Cruz on the Gulf, announces Gen. Heriberto Jara, Minister of Marine. The work is being done by the Mexican government.

President Manuel Avila Camacho assigned the military engineering c to draft plans and a budget for the b ing of a military city at Mazatlan, key Pacific port worst hit by a re hurricane that did damage estimate nearly $2 million.

The President ordered that full fed government facilities be granted for reconstruction of destroyed buildings

The Morrison-Knudson Co., Inc., bu ers of bridges, highways, airports, ways, dams, etc., in the United Sta Hawaii and other Pacific Islands, has up a company in Mexico called Morri Knudsen de Mexico. Walter Morti Parsons, who has had many years experience in the mining and const tion fields in the states, is head of organization. Parsons says the Mexi company will become the spearhead expanded activities not only in Mex but in all of Latin America. Organi only a short time ago, the company ready has obtained some large contra including construction work on the sou eastern division of Mexico's national r ways, and the paving of the Tampico a the Vera Cruz airports.

Reclamation engineer honored in ship naming

A new Liberty ship of the United States Merchant Marine has been named the "Arthur P. Davis," after a former chief engineer of the U. S. Reclamation Service who died ten years ago.

In 1909 Davis was appointed one of a board of seven engineers to examine and report on the possible type of canal to be built at Panama. He was appointed assistant chief engineer of the Reclamation Service in 1902. He later became chief engineer and then director of the service. He was responsible for the construction of the Shoshone and Arrowrock dams, each in turn "the highest in the world"; the Elephant Butte Dam, Roosevelt Dam, the 6-mi. Gunnison tunnel, and other projects comprising over 100 dams, canals, tunnels and other irrigation jobs.

In 1920, Davis was authorized by Congress to make a study of the Colorado River to solve the flood problem. He recommended the construction of the Boulder Dam substantially as it stands, and aided in choosing the site.

The Mokelumne River water project, with 95 miles of tunnels and aqueducts, delivering water to Oakland, San Francisco, and other California cities, was completed under Davis' supervision.

He spent more than two years in Russia, supervising the construction of a hydro-electric system. In 1914 he was sent to China by the American Red Cross to study flood control.

In 1933, after retiring from the Reclamation Service, he was appointed consulting engineer on the Boulder dam project. He died the same year in Oakland, Calif.

The Liberty ship carrying his name was constructed by the Henry J. Kaiser California Shipbuilding Company, and was launched at Terminal Island, Los Angeles.

• • •

Last link to be built on Canada-Mexico road

Construction is to be resumed on the last link of the new Nevada-Idaho-Oregon highway, which will put U. S. Highway No. 95 through from the Canadian line to the Mexican border. The Oregon highway commission will open bids in Portland on Dec. 21 for new construction and for surfacing of existing roadbed in Malheur County.

◆

Edward J. Maier, chairman of the Newark, N. J., Central Planning Board, recently announced that the board will "make a recommendation" to the city Commission on hiring of an engineering firm to draw a master plan for the city of Newark.

A.S.A. adopts standard for structural steel

The American Standards Associati has added another building standa Structural Steel (Riveted, Bolted a Welded Construction) A57.1-1943, its group of building code specificatio There are 26 sections to the standa covering such subjects as allowa stresses, effective span length, conne tions, rivet and bolt spacing, camb workmanship, erection, etc. Applica generally to the design, fabrication, a erection of structural steel for buildin and other structures, the standard do not, however, cover steel joists, membe formed of flat rolled steel, light-ga steel construction, skylights, marquis (except structural frame), fire escap or other miscellaneous light steel co struction; subjects which are still bei studied by committee, A57.

This standard was developed under t leadership of the American Institute Steel Construction and the American S ciety of Civil Engineers. It is one of series of building standards being work on by technical committees operating u der the supervision of the America Standards Association's Building Co Correlating Committee. Each standard i the series will provide good practi recommendations suitable for incorpora tion into building codes, either by incl sion of the text or by reference.

MEN AND JOBS

rge L. Burke, Jr., of Greensboro, N. has been promoted to major from tain at the Grenada, Miss. Army Air ld, where he is post engineer. A grad- e of the North Carolina State College ool of Engineering, he served as con- ction engineer on a number of North rolina projects prior to entering the ny in 1940.

pt. Chester A. Dean, Corps of Engi- rs, U. S. Army, formerly with the ansas highway department, has been moted to major at the Kansas City, ., Quartermaster Depot. He was post ineer. To his former duties have been ded those of director of utilities and ot fire marshal.

N. Norman, of New Bern, N. C., who been serving as director of sanitation Craven County, N. C., has been named trict supervisor of sanitation in Cra- n, Beaufort, Carteret, Greene, Lenoir, tt and Wayne counties, N. C. His head- arters are at New Bern.

j. George T. Littlefield, Corps of gineers, is area engineer of the Eglin ld area, which is under jurisdiction of e Mobile district of the U. S. Army gineers. He is responsible for the su- rvision of construction of all work in e Eglin area, which consists of Eglin ld proper, numerous auxiliary air- omes, bombing ranges and gunnery nges covering an area in excess of 650 uare miles.

illip H. Beauvais has accepted appoint- ent as city manager of Alma, Mich. e succeeds W. E. Reynolds who re- gned recently. Beauvais formerly was ty manager in Manistee, Royal Oak d Manistique.

Frank Virr has returned to his former sition in the Kansas highway commis- on after being loaned for defense work Wyatt C. Hedrick, architect-engineers. e has worked on Camp Phillips at Sa- na, the Garden City Airbase and auxili- ry fields, and the Pratt Army Airbase.

owell L. Wells and **C. H. Vinckier** have signed their positions with the Kansas ighway commission and have joined the eabees.

. Col. Homer G. Olmsted, camp engi- eer at Camp Hood, Tex., has retired to n inactive army status and returned to is practice of consulting engineer at ouston, Tex. Two years ago, Lt. Col. lmsted served for a while as officer-in- harge of all construction work at Elling- on Field at Houston. In civil life he has een consulting engineer for many towns and cities in the Southwest, South America and Mexico.

Col. B. F. Vandervoort, civil engineer, has been returned to active duty as Chief of the Price Adjustment Section, Ohio River Division, Columbus, Ohio. Shortly before his return to duty, Colonel Vandervoort received the Legion of Merit decoration from the War Department for his previous duty as zone constructing quartermaster at Columbus, Ohio, and his recent work as chief of the price adjustment section.

Maj. Caspar W. Haupt, civil engineer, has assumed duty as chief of the price adjustment section for the Missouri River Division, Omaha, Neb.

Earle V. Core of White Plains, N. Y., on January 1 will become chief valuation engineer with the Lehigh Valley Railroad.

Neal Hawkins of Gastonia, N. C., is supervising the grading work for a housing project for the Firestone Tire & Rubber Co.'s fabric plant. **P. T. Withers** of Gastonia is in charge of the sewer and water construction on the project.

John A. O'Leary, until recently resident engineer for the Corps of Engineers on a long section of the Inter-American Highway in western Panama, is now employed by the Army Engineers at the Navajo Ordnance Depot at Bellemont, Ariz. Mr. O'Leary in his present work is aiding in the surfacing of 168 miles of highway. Before joining the Army Engineers he worked for several years as an engineer with the Los Angeles County engineering department.

Raymond L. Nelson, of Gaylor, Minn., has been appointed Chippewa County engineer at Montevideo to succeed A. L. McKay, who resigned to accept a position with the Minnesota State Highway Department. Mr. Nelson is at present employed on the Alaska highway project.

Maj. Ernest A. Shafer has taken over duties at Desert Chemical Warfare Depot, Utah, as post engineer. He replaces

Capt. R. F. Rosenbach, who has served as post engineer since its activation. Captain Rosenbach has left for new duties as post engineer at Luke Field, Arizona. Major Shafer comes from Hammer field army airbase, Fresno, Calif.

L. J. Markwardt, chief of the Division of Timber Mechanics at the U. S. Forest Products Laboratory, Madison, Wis., since 1938, has been appointed assistant director of the laboratory. He has been a member of the laboratory's technical staff for almost 30 years. He will be responsible for the operation of the divisions of timber mechanics and material containers, which conduct packaging research and testing work for the Army Ordnance Department, Army Air Forces, Navy, War Food Administration, and other war agencies. He will also serve as coordinator and consultant to all other laboratory divisions on timber mechanics.

Everett N. Hutchins, associate civil engineer for some years with the Massachusetts Department of Public Works, has been promoted to district waterways engineer, in the division of waterways in the same department.

Luke H. Boykin, a member of the engineering corps of the Alabama Power Co., at Huntsville, Ala., until he enlisted as a lieutenant in the 151st Engineers Battalion about two years ago, has been promoted to the rank of lieutenant colonel on the staff of Gen. Charles H. Corlett. He has been on duty in the Aleutians for some time and has been stepped up to his present rank in regular order.

James T. Gobbel has been appointed manager of the Greenbelt, Md., Community Project of the Federal Public Housing Authority, succeeding Roy S. Braden who has been appointed city manager of High Point, N. C. Mr. Gobbel was formerly manager of Arlington County, Va., and city manager of Hopewell, Va.

First Lt. William P. Duff, of Raleigh, N. C., former office engineer and field man for the North Carolina Highway and Public Works Commission, has been named post supply officer at Selman Field, Monroe, La.

Maj. Virgil E. McDaniel, of Bellrose Manor, N. Y., former construction engineer, is now stationed with the 1324th Engineer Regiment at Camp Butner, N. C., after having seen service in North Africa.

Randolph Rowe, who has been resident engineer for the state highway department at Hamilton, Ala., since 1939, has been transferred to a similar position in District 1, Division 2, Birmingham. Marion and Winston counties, which Mr. Rowe has served, have been transferred to the Frst Division, with headquarters at Decatur, Ala.

Appointment of **Capt. John C. Farley,** U. S. Army retired, to be power engineer at the Denison Dam office of the Southwest power office, has been announced. Captain Farley joined the U. S. Army District Engineers at Tulsa, Okla., in 1941, and returned from the Southwest Pacific only a short time ago.

Indefinite extension of NHA is proposed in new Senate bill

Measure would also set up a Disposition Division, and give local planning boards an opportunity to decide what to do with war housing after the war

A bill introduced into Congress by Senator Maloney Dec. 18 would prolong the life of the National Housing Agency indefinitely, whereas under present law it would terminate with the war. The proposed legislation, contained in S. 1607, also would set up immediately within the agency a Disposition Division, and would give each community a say as to what was to be done with its war housing. It also provides that war housing can be sold to local housing agencies, forbidden by present law, which provides that war housing be torn down within two years after the war.

The intent of the present law, a spokesman for NHA has pointed out, is to prevent temporary, unstable housing from turning into slum districts; and it also takes into account the fact that many cities relaxed their zoning rules to permit housing to go up in zones where it would not be permitted in peace times, and further takes into consideration the fact that much of the housing is on leased land which has to be restored to the owners. Some of these matters in the new bill are left to the discretion of the communities and NHA, as later noted herein.

The various government agencies—which, obviously, would include the Army, Navy, and Maritime Commission—would within 30 days after close of the war transfer their war housing to the NHA for disposition.

Planning boards suggested

The NHA is to "encourage" communities to create planning boards to advise with NHA, under the new bill. Within three months after the end of the war, each community would submit recommendations to the NHA as to disposition of all of its war housing, giving consideration to such particulars as to whether housing should be destroyed, removed, sold to a local public housing agency or to private parties for rental purposes, or as separate family units; restrictions as to future use; what facilities—such as streets, sewers, water—should be furnished by the government; future zoning and building regulations; "and timing of sale to minimize adverse effect upon the real-estate market."

Lacking recommendations from the community, or failing to secure its agreement, NHA would submit its proposed program (and, if available, that of the dissenting community) to the state planning board, with the request for an opinion within 30 days. "After the termination of this period of 30 days," the bill provides, "the National Housing Agency shall proceed to dispose of such housing in such manner as it considers in the public interest in conformity with the policy and principles set forth in this act."

In contrast to the present two-year period for tearing down housing, permanent structures could be continued in federal ownership for three years, while temporary housing not on leased land would have to be removed or demolished within five years, and that on leased land before expiration of the lease.

"Sales of projects by the National Housing Agency to a local public housing authority shall be made only if such authority is officially established by the community," with approval of the proper officials, and "on proof of need of low-rent housing for low-income tenants submitted by such officials."

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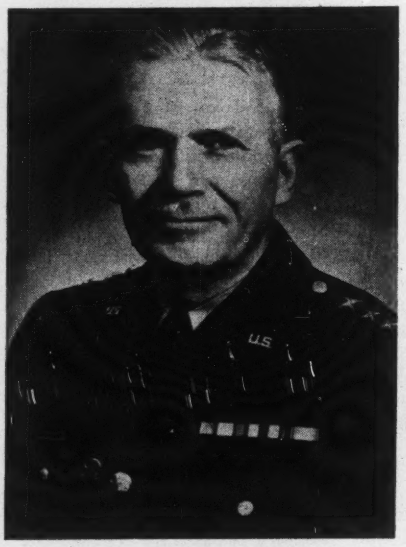
Moles annual award to Somervell and Johnson

Lieutenant General Brehon B. Somervell, Chief of the Army Service Forces, and Arthur A. Johnson, New York contractor, will receive awards "for outstanding contributions to construction progress," given each year by The Moles, New York organization of tunnel and heavy construction men. Presentatio will be made at a dinner meeting at th Roosevelt Hotel Feb. 2, according to a announcement by Charles B. Spence chairman of the award committee.



Lieut. General Somervell

Selected for the award in recognitio of his brilliant administration of th A.S.F., General Somervell has directed larger program of construction and pr duction than any man in history within similar period. The Arkansas-born engineer-officer commands one soldier i every four in the Army and employ nearly 1,000,000 civilians to carry ou the Army supply program. Before General Somervell's appointment in 1942 a commanding general of the Services o Supply, which was to become A.S.F., he had for two years directed the Construction Division of the Quartermaster Corps at the time they were doing all of the Army building. Before that he spent four years as WPA administrator for New York. His career with the Corps of Engineers, U. S. Army, began with his graduation from West Point in 1914. He served in various capacities with the A.E.F. in France during the first World War and has been awarded both the Distinguished Service Cross and the Distinguished Service Medal.

Arthur A. Johnson

Arthur A. Johnson is president of the Arthur A. Johnson Corp. and chairman of the Postwar Public Works Committee of the General Contractors Association of New York. For more than 35 years, Mr. Johnson has been engaged in building subways, tunnels and other important engineering works in and around New York including preparation of the site for the recent World's Fair. His recently completed war contracts include the Letterkenny Arsenal at Chambersburg, Pa., which was finished in 200 days at a cost of $9,000,000. He was also one of three contractors on the $30,000,000 Bermuda Army Air Base.

Mr. Johnson has twice served as president of the General Contractors Association of New York. He is now serving his fifth term as president of the Chamber of Commerce of the Borough of Queens and is a vice president of the Moles.

U. S. Army makes change in division engineers

Col. Clark Kittrell, former division gineer, Middle Atlantic Division, U. S. Army Engineers at Baltimore, Md., was transferred Oct. 1 to Chicago as division engineer of the Great Lakes Division. He succeeds Col. R. G. Barrows who has been transferred to overseas duty in the southwest Pacific.

Col. Kittrell

A native of Georgia, Col. Kittrell was aduated from the United States Mili- ry Academy in 17 and received a S. of C. E. degree 1923 from Michi- a Institute of chnology. From 33 to 1937 he rved as construc- on engineer of the ort Peck Dam on e Missouri River eastern Montana nd was district engineer of the Fort Peck istrict at the time of the great earth slide f Sept. 22, 1938, in the upstream bank of e dam (*ENR*, May 11, 1939, p. 647). hroughout 1942, Col. Kittrell was en- aged in military construction in Pan- ma and Central America.

Col. Barrows

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New water tunnel planned for Baltimore supply

A contract for geological surveys on he route of a proposed new water tunnel or Baltimore, Md., which is designed to urnish a temporary supply as well as fit nto permanent plans for increasing the ity's water facilities, has been awarded o the Riley Drilling and Engineering Co. of Brooklyn, N. Y., at its bid of $38,255.

The tunnel will be about 4½ miles long nd will connect Lake Ashburton, in orthwest Baltimore, with the Montebello filtration plant.

Leon Small, head of the Bureau of Water Supply, announced that the city expects to start construction work on the tunnel project shortly after the first of the year if federal priorities for materials can be obtained.

Funds for the tunnel project will be taken from the $12,500,000 water loan approved last May. All construction work will be supervised by the Public Improvement Commission. The tunnel project will be the first step in a water program which involves the construction of a new dam on the Patapsco River.

JOBS OF THE WEEK

DWELLINGS, Lakewood Village, Calif.

Griffith, Walker & Lee, Lakewood Village, Calif., 209 frame, stucco defense dwellings. Owner builds. Estimated cost is over $500,000. C. N. Aldrich, Long Beach, Calif., is the architect.

PERSONNEL AND SERVICE BUILDINGS, Dublin, Ga.

Bureau of Yards & Docks, Navy Department, Washington, D. C., has awarded the contract for the construction of a personnel and service building to Hardaway Contracting Co., Columbus, Ga. Bid items 1 and 9, $1,008,400.

ROADS, WALKS, etc., Dublin, Ga.

Bureau of Yards & Docks, Navy Department, Washington, D. C., has awarded the contract for the construction of roads, walks and services to R. A. Bowen, Macon. Bid items 1 and 9X, $682,033.

FOUNDRY, Ohio

Lake City Malleable Co., Cleveland, has awarded the contract for the design and construction of a brick, steel malleable foundry, to Rust Engineering Co., Pittsburgh, Pa., $3,360,000. Defense Plant Corp. will finance.

TUNNEL, Montana

Northern Pacific Ry. Co., B. Blum, chief engineer, St. Paul, Minn., has awarded the contract for the construction of a 2,850-ft. tunnel 24 ft. wide and 24 ft. high, between Bozeman and Livingston, to J. C. Boespflug Construction Co., Seattle, Wash. The estimated cost is over $1,000,000.

FACTORY, Texas

General Tire & Rubber Co., R. Iredell, chief engineer, Akron, Ohio, has awarded the contract for the erection of an auto tire manufacturing plant, to Brown & Root, Inc., San Antonio, Tex., at approximately $3,200,000.

DWELLING UNITS, Warner Robins, Ga.

Public Housing Authority, NHA, Atlanta, Ga., has awarded the contract for the construction of 560 family dwelling units to R. M. Lee, Atlanta, at $926,401.

DWELLING UNITS, San Diego, Calif.

Public Housing Authority, NHA, San Diego, awarded the contract for the construction of 1,600 temporary family dwelling units, to E. S. McKittrick Co., Huntington Park, at $3,201,508. Bodmer, Wurdeman & Beckett, San Diego, Calif., are the architects.

HANGARS, etc., Bedford, Mass.

U. S. Engineers, Boston, Mass., received lowest bid for hangars, grading, utilities, etc., Middlesex County, from John Bowen Co., Boston, Mass., at $547,409.

PARKING APRON, Muroc, Calif.

U. S. Engineers, Los Angeles, Calif., awarded the contract for additional parking apron, to Bressi & Bevanda Constructors, Inc., Los Angeles, and United Concrete Pipe Corp., Los Angeles, $1,000,000.

TEMPORARY CONSTRUCTION, Yuma, Ariz.

U. S. Engineers, Los Angeles, Calif., awarded the contract for temporary construction at Army Air Force Advanced Flying School, to Del E. Webb Construction Co., Phoenix, Ariz., at $502,049.

DWELLINGS, Turners Station, Md.

Day Village of Baltimore, New York, N. Y., awarded the contract for the construction of 56 two-story, brick dwellings containing 500 units, including 5 stores and project manager's home, to Day Construction Co., New York, N. Y. The estimated cost is $1,350,000.

Note—Additional bidding and contract news on many projects large and small appear in the Construction News section beginning on page 103.

Army engineers practice mountain road building

Army engineer troops from Camp Sutton, N. C., have begun construction of a "pioneer" road in the Great Smoky Mountains National Park in western North Carolina to gain practice in mountain road building. Approximately 1,500 men and around 150 pieces of equipment have arrived in the area.

Recommended standard for bituminous fiber pipe

The U. S. Department of Commerce is circulating the draft of a recommended commercial standard for bituminized-fiber drain and sewer pipe, TS-3619, based on the proposal of a large manufacturer and adjusted in line with comment from other manufacturers, distributors and users.

OBITUARY

Levi Richard Muir, 56, Salt Lake City, Utah, died Dec. 15. Associated with the Utah road commission for 30 years, Mr. Muir was considered a leading analyst of soil and road building materials, and had designed the surface materials for many of the hard roads in Utah. In 1912 he helped to install the first concrete road in Utah, between Salt Lake City and Bountiful.

Robert A. McLeod, 61, Birmingham contractor, died on his farm at Brent, Ala., Dec. 13.

Percy E. Hoak, 54 president of the Wheeler Lumber & Supply Co., Des Moines, Ia., died Dec. 4 at Miami, Fla. Mr. Hoak was well known in contractors' circles.

Clifford C. Smith, 79, retired construction engineer who supervised the building of some of Cleveland's noted stores and public structures, died Dec. 14, at Cleveland, Ohio.

Charles Leininger Bradley, 58, builder, and one of the early associates of the Van Sweringen brothers, died Dec. 18, at Cleveland Heights, Ohio. Mr. Bradley was in charge of the completion of the Terminal Tower, the Van Sweringen monument.

Harold L. Bond, 77, former president of the Harold L. Bond Co., and of Waldo Bros., Boston, Mass., for many years a prominent figure in the construction and building equipment industry in New England, died at Newton, Mass., on Dec. 17. During World War I he was manager of the New England district, division of supplies, Emergency Fleet Corporation. He retired in 1935.

R. V. Gay, 48, of St. Johns, director of the Michigan Planning Commission, died Dec. 16.

Merrill D. Knight, 83, former superintendent of county roads in Maryland, died Dec. 7, in Washington. Mr. Knight was a contractor in Washington for many years.

Edwin Georges Evans, 78, died Dec. 15 in Moncton, N. B. Mr. Evans was manager of the Bouctouche railway for a number of years. When that was incorporated into the Canadian National Railways, he joined the engineering staff.

Edwin Stanton Fickes, 71, a senior vice president, Aluminum Co. of America died Dec. 19 at Pasadena, Cal. A civil engineering graduate of Rensselaer Polytechnic Institute, he supervised construction of bridges across the Ohio River. In 1900 he became chief engineer of the Aluminum Co.

William H. Struve, Sr., 80, retired general contractor of Davenport, Iowa, died recently. He built many of the larger buildings in Davenport.

Raymond M. Stotler, 40, of Seattle, engineer with the Washington State Highway Department, died Nov. 30. A graduate of Washington State College, he was employed by the Puget Sound Bridge & Dredging Company until he joined the highway department ten years ago.

Clair J. Swift, 48, Minneapolis, Minn., for eight years district engineer of the Minnesota State Highway Department, died Dec. 8. Formerly, he was connected with the Blue Earth County engineering department, serving 6 years as assistant county engineer and 11 years as county engineer.

Mario Lorini, 88, former engineer for the New York City Bureau of Water Supply, died on Dec. 13.

George William Weast, 57, engineer for the District of Columbia Sewer Department, died Nov. 30.

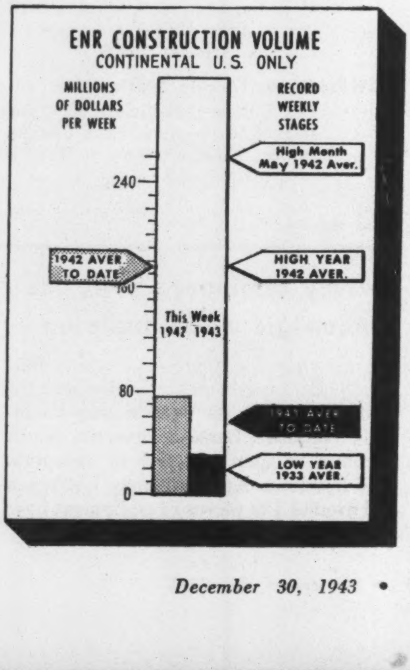
Charles Sumner Cunningham, 86, Swampscott, Mass., building contractor and founder of the C. S. Cunningham & Sons Construction Co., Lynn, Mass., 45 years ago, died Nov. 18.

CONTRACTS AND CAPITAL

CIVIL ENGINEERING construction volume in continental U. S. totals $28,180,000 for the week. This volume, not including the construction by military engineers abroad, American contracts outside the country, and shipbuilding, is 19 percent lower than in the preceding week, and is below the $76,295,000 reported for the holiday-shortened week in 1942.

Private construction for the week is 65 percent above last week, but public construction is down 31 percent as a result of the 43 percent decline in state and municipal construction and the 30 percent decrease in federal volume.

The current week's volume brings 1943 construction to $3,061,844,000, an average of $58,882,000 for each of the 52 weeks of the period. On the weekly average basis, 1943 construction is 66 percent lower than the $9,305,829,000 reported for the 53-week period in 1942.



Private construction, $491,298,000, is 10 percent lower than a year ago, and public construction, $2,570,546,000, is down 70 percent when adjusted for the difference in the number of weeks.

In the classified construction groups, gains over last week are in sewerage, industrial buildings, and earthwork and drainage. Increases over the 1942 week are in sewerage, industrial and commercial buildings, and earthwork and drainage.

New capital for construction purposes for the week totals $198,000, and is made up entirely of state and municipal bond sales. The week's new financing brings 1943 volume to $3,073,080,000 for the 52-week period, a decline of 69 percent from the $10,219,318,000 reported for the 53 weeks of 1942.

CONTRACTS

Continental U. S. Only
(Thousands of dollars)

	Week Ending Dec. 31 1942	Dec. 23 1943	Dec. 30 1943
Federal	$67,583	$28,073	$19,674
State & Municipal	5,727	2,185	1,251
Total public ..	$73,310	$30,258	$20,925
Total private .	2,985	4,397	7,255
TOTAL	$76,295	$34,655	$28,180
Cumulative			
1943......(52 weeks).......			$3,061,844
1942......(53 weeks).......			$9,305,829

Note: Minimum size projects included are: Waterworks and waterways projects, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

NEW PRODUCTIVE CAPITAL

	Cumulative 1942 53 weeks	1943 52 weeks
NON-FEDERAL ..	$640,132	$319,242
Corp. Securities.	182,729	22,431
State & Mun....	217,248	130,633
R.F.C. loans ...	157,455	15,045
FPHA loans ...	....	3,133
R.E.A. loans ...	....	20,000
Fed. Aid Hwy...	82,700	128,000
FEDERAL	$9,579,186	$2,753,838
TOTAL CAPITAL.	$10,219,318	$3,073,080

ENR INDEX NUMBERS

Index Base=100		1913	1926
Construction Cost...	Dec. '43	294.51	141.57
Building Cost......	Dec. '43	231.49	125.14
Volume	Nov. '43	149	65

Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

Wind Storm Observation

Sir: In the past several years two severe storms, one from the southwest the other from the northwest, caused considerable wind damage here. The southwest storm (called by newspapers "The Armistice Day Storm Over Lake Michigan") among other things lifted a south sloping section of a filling station roof 29x16 ft. in area, and sailed it 200 ft. onto the main street of Newberry. The section clipped off a 4-in. branch from a maple tree at 75 ft. or more from its starting place.

Unfortunately, no aneometer readings were recorded, but from data at the scene I computed the wind velocity to be 55.9 miles per hour. This I checked with the Chicago University U. S. Weather Bureau (56 m. p. h.) to be correct.

The northwest storm lifted a north-south shed roof and, except for the attached north end, lifted it to the east, including side-wall sections, depositing the 180x40-ft. roof parallel to its first north-south position, immediately eastward. From the fact that 25,000 ft. B. M. of lumber was used to rebuild the roof, I computed the velocity of uplift to be 56.1 m.p.h.

I disputed at the time considerable comment that the storm was a tornado, maintaining that it was a dip of the wind caused by local heat and buildings. The figures above corroborate my earlier conclusions. Also, the N. W. storm, severe as it was, caused no drop in the record of a barograph located about $\frac{5}{8}$ of a mile southwest of the wrecked shed.

R. R. Ryan
Newberry, Mich.

Plywood Girders Not New

Sir: The *ENR* article "Plywood Plate Girders for Buildings" published Nov. 4, 1943, p. 690, refers to girders with plywood webs and timber flanges as a "new product." I would like to call your attention to the tests of Alfred Boyd, professor of civil engineering at the University of North Dakota. Girders with the flanges bolted with connector rings to the plywood web and with the flanges glued to the plywood web were designed by Professor Boyd and were manufactured and tested under his supervision in 1936. These tests were reported in the *Engineering News-Record*, Oct. 15, 1936, p. 534.

Edward A. MacLean,
Professor of Civil Engineering,
Rose Polytechnic Institute,
Terre Haute, Ind.

Cube Root by Slide Rule May Be Simplified

Sir: The method of accurately extracting cube roots by slide rule as presented by D. A. DuPlantier in *Engineering News-Record*, Nov. 4, 1943, p. 698 may be slightly simplified and its accuracy further increased by neglecting all terms containing the differential of *x* above the first degree before combining terms as follows:

$$\text{Let } x = x_1 + dx$$

Then $x^3 = x_1^3 + 3x_1^2\,dx + 3x_1\,dx^2 + dx^3$

Discarding terms containing dx^2 and dx^3 (which are small enough to be negligible):

$$x^3 = x_1^3 + 3x_1^2 dx \quad \text{(Approx.)}$$

Whence $dx =$

$$\frac{x^3 - x_1^3}{3x_1^2} \text{ (Approx.)}$$

Applying this equation to the extraction of the cube root of 71,215.68, which was the example given, using standard tables of the function of numbers:

$$\begin{array}{llll} x_1 = & 41.40 & x^3 = & 71{,}215.68 \\ x_1^2 = & 1713.96 & x_1^3 = & \underline{70{,}957.94} \\ & & x^3 - x_1^3 = & 257.74 \end{array}$$

$$dx = \frac{257.74}{3(1713.96)} = 0.050$$

$$\text{And } x = 41.450$$

This value is closer to the exact value of 41.45006 than may be obtained by use of the equation $dx =$

$$\frac{x^3 - x_1^3}{3(x_1^2 + x_1)}$$

George Varga,
E. E. Pfeiffer Builders, Inc.,
17 West 46 St., New York, N. Y.

Spun Glass Hazard

Sir: In your timely and interesting article on salvaging the former "Normandie," (*ENR*, Aug. 12, p. 264) you state: "An unexpected hazard was spun glass, which had been used for insulation throughout the ship, and which penetrated the diver's suit and into the skin pores. No way was found to remove the fine glass, except allowing time for it to grow out."

This statement evidently was based on information released by the Third Naval District, New York City, and could easily be construed to apply to Fiberglas instead of the European spun glass, manufactured by methods now obsolete, which the "Normandie" actually contained.

We wish to call your attention to the following excerpt from a letter from Lt. Com. C. F. Chandler, who was resident salvage officer on the vessel to Owens Corning Fiberglas Corp.: "In the interest of clarification, it should be pointed out that the material mentioned in these releases, in so far as we are cognizant, was of French manufacture, installed in the vessel during its construction at St. Nazaire, and should not be confused with fibrous glass products as manufactured by you which, as a matter of record, are specified and extensively used by the Navy in construction, conversion, maintenance, and overhaul of all types of naval vessels."

We do not want so influential a magazine as *Engineering News-Record* to leave its readers with the erroneous impression that the use of Fiberglas creates a health hazard. We trust you will clarify your statement, as the Navy has done.

Robert L. Bowers,
Gustin-Bacon Manufacturing Co.
Kansas City (7) Mo.

Editor's Note: In awarding an Army-Navy "E" to Gustin-Bacon Manufacturing Co., Rear Admiral Charlton, USN, stated: "Steel ships must be insulated . . . practically all of our insulation is done with Fiberglas board . . . It is standard equipment in all new construction and is being installed in older vessels in place of the highly inflammable material we used to employ . . . you should be glad to know how highly important the Navy considers this product, and you should be proud to feel that each foot of this board which goes out of here is insuring the safety and comfort of our men at sea."

EDITORIALS

VOLUME 131 NUMBER 27

December 30, 1943

Forward Buying of Construction

A NUMBER of large construction and engineering firms have recently been reported as executing contracts for work to be carried out in the postwar period. It is a sign of the times that neither prospective purchasers of construction nor engineers or contractors can afford to ignore. Just as after the last war, it is going to be first come, first served. The owner who has plans ready when materials and labor become available will have a big advantage. He can enlarge this advantage many fold if he can let the actual contruction contracts now, so that the contractor can order the necessary materials and equipment for future delivery. Once the war is over, it is going to be difficult for the government to continue a tight priority system, much as it may want to, and those owners with a lien on the first available civilian production will benefit. As for engineers and contractors who do not take part in this "forward" planning, they will find themselves caught in the rush, with more clients than they can handle and none of whom they can serve satisfactorily because someone else has pre-empted the materials and equipment. The way out is to stage the "rush" now, creating a backlog of demand that the manufacturers can count on in planning their production. Those owners who are buying construction now are doing a good turn both for themselves and for the nation.

Juries Favor Individuals

A JURY RECENTLY DECIDED in favor of a worker injured on a large construction project, who sued the contractor for $30,000; this despite testimony by competent doctors that much of the permanent trouble complained of by the workman was caused by disease, and not be injury. Whatever the facts and their right interpretation in this case, contractors have learned that whenever a damage suit goes to jury trial, the claimant will probably win. It has become axiomatic that juries favor the individual rather than a corporation. When individuals can collect damages (usually heavy) in a high percentage of injury suits, the cost of insurance increases, and the cost of construction is thereby raised. Fairness to injured workers is desired by every contractor worthy of staying in business. Moreover, the majority of contractors is constantly adopting new measures, and often expensive ones, to assure more safety in construction. But unless judgments are rendered with more justice, safety provisions are going to be slighted, and construction costs will be increased. Contractors should emphasize these points in their testimony. And, on their part, the courts should instruct and guide juries more intelligently than they have in the past.

Postwar Highway Planning

THE POSSIBILITY of state highway departments using private consulting engineers to aid them in getting out postwar designs was the subject of an editorial in these pages Dec. 2. Hardly was the ink dry when Pennsylvania announced that it had hired a consultant to develop contract designs and specifications for the Penn-Lincoln Parkway in Pittsburgh, an action that warrants emphasis. In the first place, the Pennsylvania consultant was not hired to plan, but to carry out field surveys and office designs on a project that had been outlined by the state engineers. This was the procedure that our editorial suggested. It did not, as some have assumed, recommend that outside consultants should do the basic planning and policy setting. Obviously none of them is equipped for such duties, while the highway department staffs are. As a matter of fact, the basic plan for the Penn-Lincoln Parkway originated not with the state highway department but with the local authorities, the Allegheny County Planning Commission and the Allegheny County Department of Public Works. This too is the proper sequence of planning—from the local to the higher units of government, and finally to outside parties, if that is necessary and desirable. The Penn-Lincoln Parkway will be an interesting project to watch unfold.

Public Works But Not WPA

PREVENTION of the return of WPA during the transition period between war and peace is of paramount importance in today's planning for tomorrow's construction. It was therefore heartening to hear Maj. Gen. Philip B. Fleming, Federal Works Administrator, in an address before the American Public Works Association, emphasize that, despite some rumors that FWA has reconciled itself to a return of WPA, no responsible official within that agency is thinking along any such lines. While industry undoubtedly will absorb a sizable number of the men returning from the war, a well-conceived and well-planned program of public works construction will probably be necessary to insure adequate employment to bridge the gap in the immediate postwar era until working conditions return once more to normal. For such a program to pay dividends, it must be made up of projects of permanent value, avoiding those that merely provide manual field jobs and thus exert no lifting effect on the economic system. Projects of permanent value, however, require designing now so that actual construction can be started quickly, just as soon as materials and labor become available. The best way to assure a return of WPA is to procrastinate on this designing job in the months immediately ahead. If we understand General Fleming, he is warning against such design delays, and is as much against a return of WPA as anyone else.

Attu and Rio Doce

So FAR AND WIDE have American engineers and construction men roamed since Pearl Harbor that a whole new lexicon has developed from their assignments. We speak glibly of Attu and Khorramshahr and Bougainville and Rio Doce, although few of us knew two years ago that such places existed. Along with this increase in vocabulary has occurred a broadening of vision. Temporarily at least the American construction industry encompasses the world, and the activities of its men and the employment of its machines and materials in far-away places become matters of absorbing interest.

It was in recognition of a responsibility to satisfy this interest and to chronicle American construction at war that several members of *News-Record's* editorial staff spent most of the past summer and fall on various foreign assignments. In this issue appear two results of those assignments, an article on the Army Engineers in the Battle of Attu, and one on the extensive construction of facilities for increasing the iron ore and mica output of Brazil's Rio Doce Valley. Together they typify the extremes of the war contribution that American engineers are making. In locale they range from the Arctic to the tropics, in personnel from fighting soldiers to hard-working, patriotic civilians, and in character from makeshift military construction to permanent facilities of substantial size. The common ground on which they meet is compounded of American organization and ingenuity, and of the effective use of rugged American construction equipment. Both Attu and Rio Doce add a bright page to civil engineering and construction history.

Boldness Needed

BOLDNESS IS NEEDED in drafting plans for postwar construction if the construction industry is to attain its maximum potentiality in the readjustment to a peacetime economy. This point was stressed by speakers at the recent meeting of the American Association of State Highway Officials. One said that, regardless of the mistakes and waste under the WPA program, those who drew it up must be credited with having approached the problem of mounting unemployment with boldness. They produced a plan and put people to work while others were doing nothing but deploring the growing unemployment.

The economic readjustment that must follow the war will be of greater magnitude than that of the Thirties, hence planning for construction work to be put under way as soon as war restrictions are lifted must be of an unprecedented magnitude. That is the merit of the program of the American Road Builders Association and of the postwar highway bill now before Congress sponsored by the highway officials association. Both call for approval of expenditures on roads far in excess of any prewar figures. Similar boldness is needed in planning other public work—city streets, buildings and services, sewage disposal, water supply, flood control and irrigation.

There are equal opportunities for bold planning in air, rail and motor vehicle transportation. But plans alone will not suffice. There must be financing as well. And here again boldness is demanded. The federal government should not be asked to foot the whole bill. Indeed, funds of state and local governments and the public service agencies should cover the greater proportion of the costs.

With both plans and funds ready to be put to work, the construction industry can confidently stand ready to do its full share in keeping the national economy from going into a tailspin of unemployment after the war. Procrastinations or timidty with respect either to planning or financing can lead only to uneconomic work relief as another editorial on these pages points out.

ENGINEERING NEWS-RECORD WALDO G. BOWMAN, *Editor*
Copyright, 1943, by McGraw-Hill Publishing Company, Inc.
EDWARD J. CLEARY, *Managing Editor*. *New York:* V. T. BOUGHTON, A. N. CARTER, H. W. HUNT, E. R. DENMARK. *Chicago:* H. W. RICHARDSON, J. R. CARR. *Washington:* PAUL WOOTON, CHARLOTTE DuBOIS. *San Francisco:* N. A. BOWERS. *Consulting Editors:* F. E. SCHMITT, W. W. DeBERARD
EDITORIAL OFFICES: 330 WEST FORTY-SECOND STREET, NEW YORK, N. Y.

ENGINEERING ABROAD AS SEEN BY ENR EDITORS

Engineers in the Battle of Attu

Harold W. Richardson
Western Editor, Engineering News-Record

***Contents in Brief**—On every battlefront the Engineers are engaged not only in building but often in actual combat. Such was the case at Attu. There, for the possession of our last outpost in the Aleutians, the Engineers operated the beach head, built roads through swampy tundra under fire, handled the supply line by tractors, cableways and by hand, and finally went into combat to turn back a vicious Jap counter attack. Though the battle took place last May, this is the first full account of the Engineer activities that has been released. The article is based on information obtained by the author on a visit to Attu and by interviews with Engineer officers who took part in the invasion.*

"READY TO FIGHT OR TO BUILD—or both" might well be the slogan of the U. S. Army Engineers, for their role in this war is both fighting and building. Attu is an example. At this bleak, fog-enshrouded pile of mountains at the far end of the Aleutian Island chain, the engineers took part in one of the toughest and bloodiest battles of the war. They landed in dense fog with the advance task force, charged with unloading equipment and supplies, establishing beachheads, and laying out, maintaining and operating the supply routes for the fighters up front.

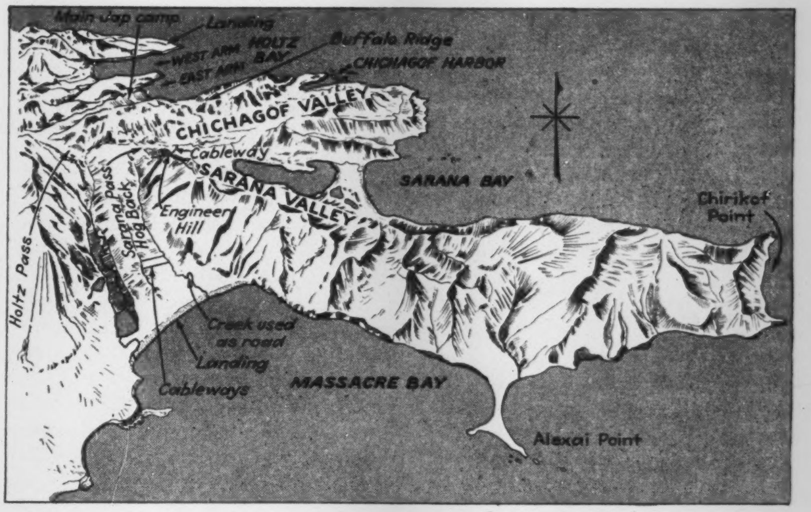
They used a creek bed for a road, they snaked supplies on sleds up a hill with tractor winches, they tumbled tractors end-over-end down a steep mountain to extend the supply route, often under fire of fog-concealed enemy posts. Then, as a climax, they bore the brunt of a thousand-man enemy counter attack that threatened the success of the invasion. Cases of dynamite, tractors and a road grader served as protective revetments as the Japs filtered through and beyond the camp of the battling Engineers. By nightfall the attacking force had been

ENR Staff Photo

Engineer Hill where the Engineer troops made history in battle. In the foreground is Sarana Valley.

wiped out to the last man. This final achievement was aided by suicidal tendencies that led scores of the Sons of Nips to blow themselves up with their own hand grenades when wounded or cornered—quite a messy affair. The next day the Engineers went back to their road building.

A sketch of the topography of the island and a review of the invasion tactics are necessary for a full appreciation of the Engineers' part in the battle of Attu.


Main Jap camp
Landing
WEST ARM
EAST ARM
HOLTZ BAY
Buffalo Ridge
CHICHAGOF HARBOR
CHICHAGOF VALLEY
Cableway
SARANA VALLEY
SARANA BAY
Chirikof Point
Engineer Hill
Sarana Pass
Hog Back
Holtz Pass
Creek used as road
Landing
Cableways
MASSACRE BAY
Alexai Point

Battle of Attu took place in the rugged terrain on this eastern end of island.

Mountainous terrain

In common with many other Aleutian islands, the topography of Attu is rugged and mountainous. Except for rock outcrops on mountain shoulders and peaks, the island is covered with typical Aleutian tundra, a treeless vegetal mat of heavy grass overlying a swampy, peat formation. Narrow, sandy and rocky beaches fringe the shoreline of the numerous bays that indent the coast.

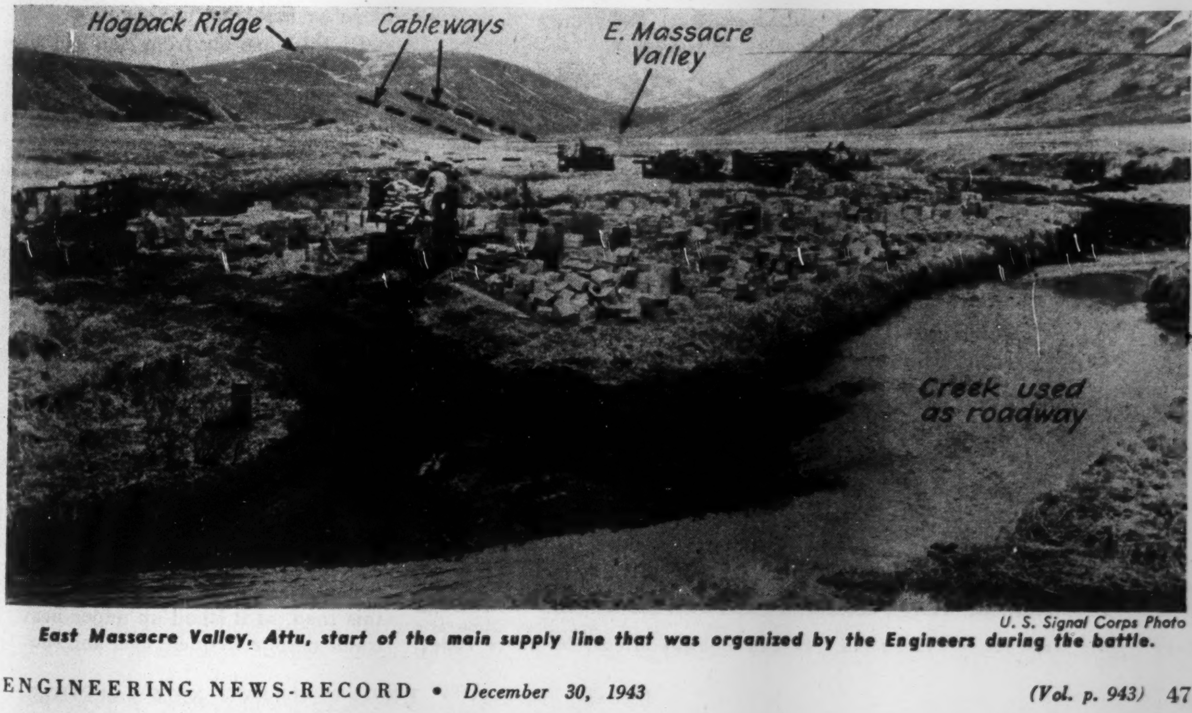
Although the island is roughly 45 miles long and 20 miles wide, all of the military action took place at the eastern end where the Japs settled after their unsuccessful attempt to take Dutch Harbor in June, 1942.

This eastern end of the island is a long peninsula terminating in Chirikof Point (see map). Along the south side of the peninsula is Massacre Bay, protected by a hammer-shaped spit of sand known as Alexai Point. To the north of the peninsula are three indentations, called, from east to west, Sarana Bay, Chichagof Harbor and Holtz Bay, the latter divided into two arms by a smaller peninsula. Valleys extending from these four bays as well as the surrounding mountains became the battleground.

Massacre Valley is divided into two smaller valleys by a long hog-back ridge. East Massacre Valley breaks out into Sarana Pass, the head of Chichagof and Sarana valleys which come together about two miles to the east. West Massacre Valley extends northward past Sarana Pass to meet Holtz Valley at rugged Holtz Pass. Mountain peaks flanking all these valleys rise from 3,000 to 3,500 ft. elevation. The valleys are swampy with deep tundra and meandering small streams.

Invasion at two points

Simultaneous amphibious landings were made May 11 by the invading task force at Massacre Beach and north of Holtz Bay. Troops landing at the latter point attempted to encircle the main Jap encampment in West Holtz Valley. Enemy resistance was encountered by both invading forces, but eventually our troops met in Holtz Pass. By this time the surviving Jap forces had retreated to the east into


Hogback Ridge
Cableways
E. Massacre Valley
Creek used as roadway

U. S. Signal Corps Photo

East Massacre Valley, Attu, start of the main supply line that was organized by the Engineers during the battle.

Chichagof Valley and its flanking ridges. In the final stages of the battle six companies of Engineers were camped on a mountain shoulder in Sarana Pass, later named Engineer Hill, charged with supply to the troops bent on annihilating the remaining enemy forces.

Six companies of Engineers landed with the Massacre Bay or south sector detachment, while only one company went in with the Holtz Bay detachment, so this account deals largely with the Massacre Bay operations. Lt. Col. James E. Green was named Force Engineer, assisted by Major James D. Bush, Jr. Lt. Col. V. L. Womeldorff was designated Resident Engineer in charge of construction.

Equipment good but insufficient

Each of the seven Engineer companies landed with the following equipment: Five medium diesel tractors, two equipped with bulldozers and two others with front-end winches; two small diesel tractors; six 6-ton crawler wagons; two jeeps, and some assorted small equipment including 105-ft. air compressors on skids. A subsequent Engineer report on the invasion deplores the lack of heavy bulldozers, cranes, shovels, draglines and trucks, all of which could have been used to good advantage. Such equipment was received just before the end of the battle, two weeks later, with the arrival of additional Engineer troops.

The Massacre Bay landing was made on an excellent soft sand beach 75 ft. deep. Beyond this beach, however, the terrain breaks off into a deep, swampy tundra slope extending for a mile to the foot of the hogback ridge that had been selected for the invasion route. This tundra blocked all use of equipment, but the engineers were not daunted. They quickly seized upon the talus-covered bed of East Massacre creek as a highway to the foot of the hogback. Supply-laden crawler wagons, hauled by tractors, soon moved in a steady stream up this improvised road.

A steep, tundra-covered slope from the creek to the top of the ridge temporarily blocked the supply line. For two days the engineers struggled to get one winch tractor and a bulldozer up the slope. Then the bulldozer cut a trough through the tundra straight down the hill to the creek, taking 5 min. for the down trip in contrast to the two days required going up. Meanwhile the crew anchored the winch tractor at the top of the ridge by simply embedding it in the tundra. A cable handled by this tractor was soon snaking supplies up the slope by means of toboggan sleds. Shortly afterwards a second cableway was set up. In both cases the empty sleds and slack cables had to be hauled down the slope by hand.

By this time the front line had advanced up the hogback toward Sarana Pass. Supplies, for a while, had to be handled by hand from the cableways to the front. It was found most expedient to establish a human chain, passing the materials from man to man, which saved the weary leg work of slogging through the swampy tundra. However, a road was immediately started along the top of the hogback. Here the fairly shallow tundra, from 1 to 2 ft. deep, could easily be stripped with bulldozers, revealing a rock or a fair hardpan base. This road was carried all the way to Sarana Pass, reaching that point May 24, the same day the enemy was driven out of both Sarana and Holtz Passes and pushed eastward into Chichagof Valley.

No attempt was made to surface this road, as it stood up under heavy traffic despite frequent rain and snow.

U. S. Signal Corps Photo

Engineer supply train leaves Massacre Beach heavily ladened for the front lines.

U. S. Signal Corps Photo

Supply train stops for fuel along the creekbed highway in East Massacre Valley.

U. S. Signal Corps Photo

Field repair station set up by Ordnance Department to aid Engineers in keeping equipment rolling during the battle.

Miserable weather—fog, snow, rain, and bitter winds—made operation of the supply lines hazardous. Then, too, enemy sniper and mortar fire constantly harassed the Engineer troops, and often a tractor would be the target for Jap artillery fire.

Meanwhile a road was started from the creek up the nose of the hogback, but for some time the cableways were the main transportation for this link of the supply lines. The creek bed route was improved by widening and straightening in spots, and served as a connecting highway from the beach until after the battle, when there was more time for difficult construction through the deep tundra behind the beach.

Tractors tumbled down mountain

On May 24, six companies of Engineers established camp on Engineer Hill in Sarana Pass, at the top of steep slopes and rugged gorges breaking out of the head of the Sarana-Chichagof valley. By this time the front line was established along the top of high Buffalo Ridge, to the west of the valley, and across the valley floor to the east. It was the Engineers' job to supply the fighting troops at these locations. Lack of roads or any other transportation made this a hand operation.

To reach the fighting troops from Engineer Hill it was necessary first to negotiate the steep slope into the valley. A switchback road was started, but the operations could not wait its completion, so another cableway was the logical answer. However, this operation required a tractor at the bottom of the slope, and also other tractors were desired for transportation across the valley floor to the foot of Buffalo Ridge to cut down the length of the hand carry.

A 40 percent slope, 1,000 ft. long, covered with heavy tundra, was too steep and swampy for the tractors to go down under their own power. As a desperate, time-saving measure, the Engineers pushed six diesel tractors over the brink of that hill. As they watched the machines tumble end-over-end down the slope they prayerfully hoped that at least one or two of the six rigs would be in running condition upon coming to rest on the valley floor. American construction equipment is built to take punishment, however, and *every one* of the six tractors was able to run when turned right side up at the bottom.

The empty drum of a tractor winch at the top of the slope served as the head sheave of the cableway. An endless line was run through this top drum and through snatch blocks anchored to deadmen in the valley floor. A tractor running back and forth across the valley pulled the sleds both up and down. This cableway served the two-fold purpose of getting supplies down the hill and wounded soldiers back up to the road at the top.

From the lower end of the cableway to the top of Buffalo Ridge supplies were carried in 100-lb. packs by a human pack train of Engineer troops, soldiers and officers alike taking part. Four round trips was a day's work.

Fighting Engineers

By the morning of May 29, the ever-lengthening supply lines were well under control. The serpentine road had been completed down the steep slope, replacing the cableway. The Japs were being cornered at the head of Chichagof Harbor. Suddenly, about 3 A.M., in a blinding snowstorm, the enemy broke through the infantry line across Chichagof Valley in a desperate 1,000-man counter attack. They surged up Sarana Valley and stormed the slopes and gorges of Engineer Hill. The Engineers had little warning of the attack, and one company, camped a short distance away from the main bivouac, suffered heavy casualties as some of the boys were trapped in their tents. Others came piling out of their sleeping bags into the snow and bitter cold only partly dressed.

Luckily, ample supplies of ammunition and hand grenades were available, and the Engineers went into bat-

U. S. Signal Corps Photo

Bulldozers struggled in the deep tundra back of Massacre Beach to level off site for supply dump.

tle with a vengeance. Tractors and the road embankment became revetments for both sides. Our troops also crouched behind piles of dynamite cases, jumping from one side to the other as the battle raged. Some 200 Japs got behind the camp, so for a while the Engineers were practically surrounded by the enemy. Meanwhile, the Japs had captured some of our 75 mm. guns and were throwing our own shells into the camp from the valley floor 500 yd. away. It is a miracle that none of these shells made direct hits on the dynamite stores or ammunition dumps.

In the darkness of the dawn and the snowstorm, hand-to-hand fighting took place within the camp. It was difficult to distinguish friend from foe. Yet hundreds of Japs were killed as they attempted to storm the steep slopes, and scores more committed suicide with their own hand grenades when wounded or cornered in the gorges.

By noon the surviving enemy troops were routed and fled to the gorges on the far side of Sarana V ley. Details of Engineers were s out after them. Every such raid highly successful, and by nightfall enemy had been practically wi out. This about ended the battle Attu, for the only Japs left wer few stragglers who escaped to hills. Weeks and months later patr would rout out a wandering, h starved Jap from his hiding place the mountains.

The fierceness of the entire battl evident from the fact that only prisoners were taken out of more th 2000 Jap troops engaged, with an es mated 40 escaping to the hills. T Engineers are credited with savi the campaign, for, had the Japs g past them to the lightly-held Massac Beach and obtained control of the su ply lines, the outcome of the bat might have been a different story. June 1 the Engineers, their fighti over, turned back to their constr tion job. The next day the War D partment announced the successf conquest of Attu.

The Attu campaign was under t general direction of Lieut. Gen. Sim Bolivar Buckner, Jr., commander, a Brig. Gen. Mark L. Whittaker, depu commander, Alaska Defense Co mand. Engineer activities were ha dled from ADC headquarters by C (now Brig. Gen.) George L. Nol staff engineer.

Long Conveyor at Shasta Dam Has Transported 11,400,000 Tons

"A satisfactory means of transporting aggregate" is the opinion expressed by local officials of the U. S. Bureau of Reclamation and the contractor with respect to the 9-mi. belt conveyor which had, prior to Dec. 1, 1943, delivered some 11,400,000 tons of aggregates from the river bed in Redding to Shasta Dam.

Bureau officials say there has been little change from the average breakage of 3 percent reported in *Engineering News-Record*, Aug. 13, 1942, p. 88. Since May 1, 1941, when the present system of chutes and rates of loading were adopted, the average breakage has been as follows:

Cobbles, 6 in. max	4%
Coarse gravel, 3 in. max	4%
Intermediate gravel, 1½ in. max	2%
Fine gravel, ¾ in. max	.02%

Although the grading tests were not correlated with moisture content there is nothing to indicate that moisture influences the amount of breakage. The water sprays mentioned in the previous article successfully eliminated the dust menace and removed fines from the return portion of the belts, which were the reasons for their installation.

They are also thought to have increased belting life by reducing the amount of abrasive material between belts and rollers and perhaps also by cooling the rubber during hot weather. An unexpected benefit, apparently due to the dust contr sprays, is reduction of wear on tran fer chute baffles and linings. All 2 flights have sprays on the return se tion for removal of adhering materi but the first eight flights do not hav top sprays because the aggregate come from the plant wet and add tional moisture was not though necessary. On the last two or three o these flights that have no top spray more wear has appeared on the trans fer chutes than where the aggregate contain noticeable free moisture.

None of the belting has been wor so much that normal conditions ar likely to require replacement befor the end of the job. A few short sec tions have been replaced because o cuts and tears from pieces of stee presumably dislodged from the trans fer chutes. This metal is not caught b the iron-detector because it is locate on the first flight to prevent entry o tramp iron from pit and plant.

High Stressed Wire in Concrete Tanks

J. M. Crom
Vice President and Chief Engineer
The Preload Company, New York, N. Y.

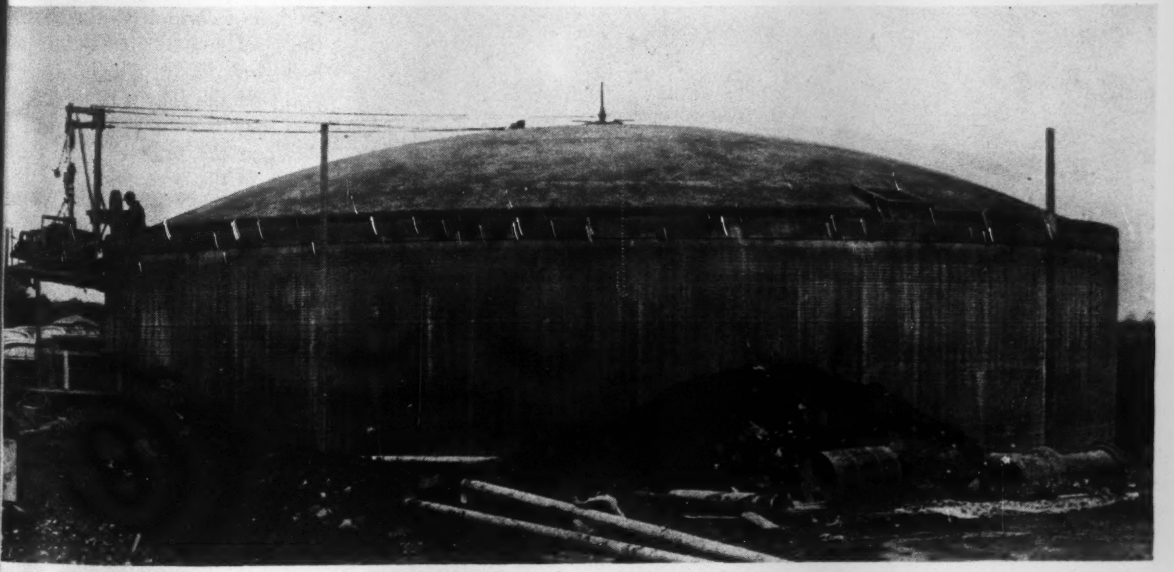
***Contents in Brief**—A method has been devised for winding commercial rades of wire around concrete tanks at stresses of 150,000 psi. and more. Using the high stress overcomes the loss of compression, caused by shrinkage nd plastic flow in the concrete, a condition that cannot be overcome with ods, which are difficult to stress in the field to much more than 40,000 si. Steel savings of 75 percent are realized and cracks are eliminated.*

SINCE 1931 the writer has superised the design and construction of everal hundred concrete tanks built ith prestressed rod reinforcement, nd, although all of these tanks are erving the purposes for which they ere built, some have required costly epairs. Occasionally workmanship as been at fault, but most frequently he need for the repairs was caused y shrinkage and plastic flow in the oncrete, which released the prestress, ermitting the concrete to be subected to tension, thus resulting in racks. Obviously, the solution of the ifficulty rests either in developing a oncrete that will neither shrink nor low, which is not a very promising rospect, or in placing a higher pretress in the reinforcement. While a higher prestress is not practicable with the steel rods conventionally used, it can be attained with a high yield point steel. In consequence, a procedure has been developed using an ordinary commercial grade wire with a yield point of 185,000 psi. for the reinforcing bands.

Several tanks reinforced with highly stressed wire have already been built, the one illustrated in this article being located at the Columbus, Ohio plant of the Curtiss-Wright Corp. Equipment and procedures have been developed to wind the wire around the tank rapidly and at any predetermined initial stress within the load capacity of the wire. Enough prestress can thus be put in the reinforcing so that it cannot be released by any possible shrinkage or flow stresses in the concrete. The use of wire also reduces by as much as 75 percent the amount of band steel required when rod reinforcement is utilized. It is believed, therefore, that a major improvement in prestressed concrete tank design and construction has been effected.

Before describing the new wire reinforced tank design, it may be pertinent to point out that the initial development of prestressed construction for concrete tanks resulted from the fundamental difficulty of making steel and concrete, whose moduli of elasticity are in the ratio of 10:1, work together as a tensile unit. When they are bonded together, as in conventional construction, the combined effect of load and concrete shrinkage will cause the concrete to be subjected to tensile stresses that cause cracks, unless the concrete section is made sufficiently heavy, that its tensile value will take all of the hydrostatic load without regard to the steel reinforcement.

The prestressed design eliminates



ig. 1. Winding wire of commercial grade and small diameter around a 400,000-gal. concrete tank at a stress of 150,000 psi.

these difficulties by keeping the concrete and reinforcing steel separated during the initial stages of construction. Thus, the concrete shell, without circumferential or band steel, is built first. After the concrete has cured the band steel is installed and prestressed and then covered with pneumatically-applied mortar. Under this procedure, neither material is restricted by the other and yet under the prestressing of the band steel, the concrete shell is given a high initial stress in compression, while at the same time a predetermined percentage of the elongation that will be caused by the live load in the tank is removed from the steel.

This theory of no tension in the concrete is of course valid only when the prestress is sufficiently high that neither the stresses from load or concrete shrinkage or plastic flow can remove it. Authorities on prestressing, such as Freyssinet, Hoyer, Billig, Lunt and Koenan, Schorer and others, agree that shrinkage and plastic flow can nullify a prestress probably as high as 45,000 psi. To this must be added the load stresses as well as those due to temperature differences between the inside and outside surfaces of the tank, which may be substantial. Since it is impractical, in
tank construction, to stress rods above 45,000 psi., it will be appreciated that most of the prestress can be lost through shrinkage and plastic flow alone.

How machine works

It was such considerations that led to the development of the machine to wind high tensile wire, fully stressed, around the concrete shell. The wire placing machine does its work rapidly. A coil of wire is mounted on it, one end being attached to the side of the tank at the starting point of the spiral. The wire passes from the coil through a resistance mechanism that is accurately controlled to impart the desired stress. The machine is hung from a supporting carriage mounted on the rim of the tank and moves at a speed of about 3 m.p.h.

After the wire is in place, it is covered with a coating of dense pneumatically-applied mortar that not only fully protects it against rusting but also serves to anchor it to the concrete walls. This anchorage is positive even though a wire should accidentally be severed. The reason for this rests in the fact that the wire, whose diameter has been reduced slightly by the prestressing, will instantly tend to resume its original diameter when cut. This increase in size acts as a pl wedge so that the stress is not los yond a few inches from the b Where more than one layer of w required each layer is shot with mortar before the succeeding lay applied.

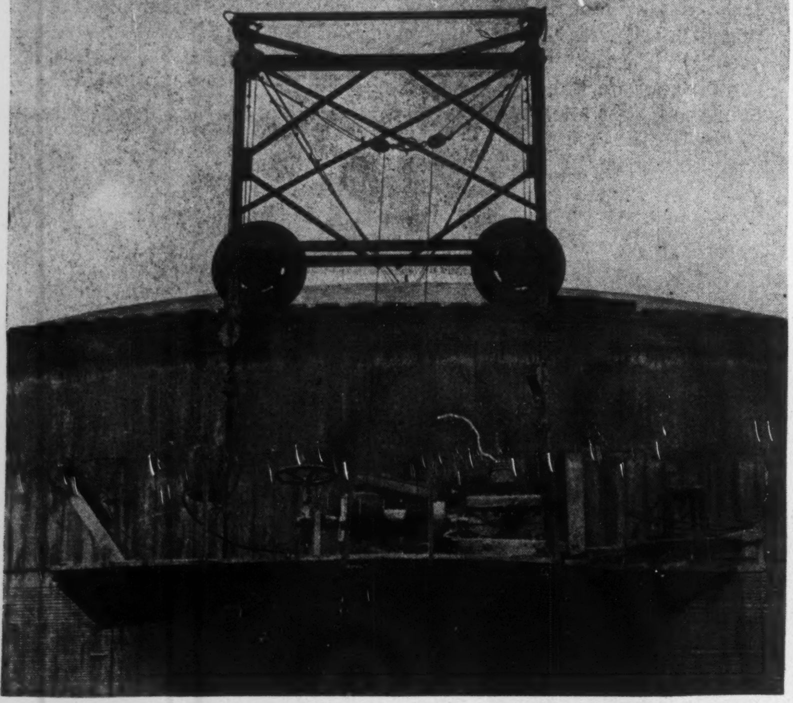


Fig. 2. Wire winding equipment is mounted on a platform suspended from a carriage that moves around the tank parapet. The machine is self-propelled at 3 m.p.h.

About 6,000 lb. of wire, rou 22½ miles, is required for the ave 1,000,000-gal. tank. At an ave rate of 2 m.p.h., a tank of this can be wound in two days. In parison, 27,000 lb. of rods would been required for the same tank, time consumed for placement w have been about seven days. The thus saved ten tons of steel and a siderable amount of time and la

With reference to theory, as viously stated, one object of prest ing is to remove in advance the gation of the steel which is ca by the application of load. Fo stance, if a load of 25,000 lb. is plied to a 100-ft. rod with a section of 1 sq.in., the rod will str or elongate one inch. If the loa 150,000 lb. it will elongate six inc A rod is properly prestressed w these elongations are produced maintained until they are taken by the design loads.

An example

To illustrate, consider the circ ferential stresses occurring in walls of a 1,000,000-gal. water having a diameter of 90 ft. an height of 21.4 ft. Assume that joint between floor and side wal free, and that the thickness of wall is 7½ in. at the bottom. Let moduli of elasticity be 30,000,000 the steel and 3,000,000 for the crete, or $n = 10$. The minimum point for the rods is to be 40,000 and that of wire 185,000 psi.

When the tank is filled the h stress in the bottom foot of the will be 60,000 lb. If rods are used a working stress of 30,000 psi. steel area A_s of 2 sq.in. will be quired.

The stresses in the composite tion under load will then be

$$f_c = \frac{60{,}000}{(7\frac{1}{2} \times 12) + nA_s} = \frac{60{,}000}{110} = 545.45$$

$$f_s = nf_c = 10 \times 545.45 = 5{,}454.50 \text{ psi}$$

Obviously, the concrete will h broken before reaching a stress 545 psi. The steel must then take of the load at 30,000 psi., and have stretched 3.4 in. over the ent circumference of 285 ft. If concr could be stretched to this amount it would have a unit stress of 3,000 psi. It is apparent, therefore, that under these conditions the design is impracticable.

Now, assume that while the tank is empty the steel bands are tightened around it sufficiently to place 545.45-psi. compression in the concrete. A tightening of the rods to a tensile stress of 24,545.25 psi. will do this. Filling the tank stresses concrete and steel as before, but now the 545.45-psi. tensile stress in the concrete caused by load simply removes the 545.45 psi. of compressive stress that had been placed in the concrete walls of the empty tank. The steel is stressed 5,454.50 psi. in tension by the load, which, added to the 24,545.25 psi. used for compressing the concrete, totals 30,000 psi. The steel, now under full load, is at the designed working stress and the concrete is without tension or compression in a circumferential direction.

If, due to shrinkage and plastic flow, a prestress of 30,000 psi. (coeff. = 0.001) is lost, then the condition described in the third paragraph hereinbefore is present and the concrete cracks.

To prevent tension in concrete

If wire is used at a working stress of 110,000 psi. then the sectional area required will be 60,000/110,000 or 0.545 sq.in. Filling the tank will stress the concrete in the bottom foot

$$\frac{60{,}000}{(7\tfrac{1}{2} \times 12) + 10 \times 0.545} = 630 \text{ psi.}$$

The steel at the same time will be stressed 6,300 psi. To prevent tension in the concrete under full load, the steel must be initially stressed to 103,700 psi. This would take out the 630-psi. compression, and the steel stress would be increased to 110,000 psi. as called for by the design.

In this case, for the empty tank, if there was a prestress loss of 30,000 psi., the initial stress would be reduced to 73,700 psi. and the compression in the concrete to 446 psi. Here the loss of compression in the concrete is only 29 percent, while in the rod tank it was 100 percent under the same shrinkage and flow conditions. Filling the tank again produces, in effect, a tensile stress of 630 psi. in the concrete and of 6,300 psi. in the wire. The concrete under full load has a tensile stress of 184 psi. as compared to 545 psi. in the rod reinforced tank. This illustrates why the higher stresses are much safer.

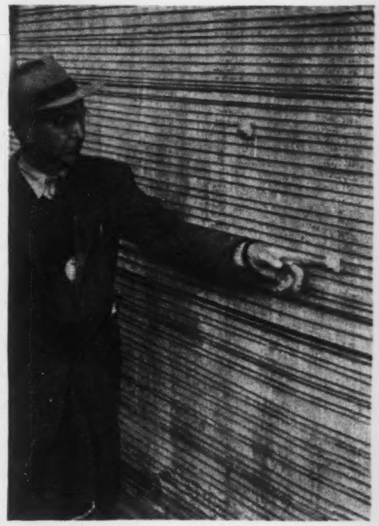


Fig. 3. Clamps bolted to tank anchor the wire every 12 to 15 strands. Tank is completed by covering the wire with mortar.

Good engineering dictates that there should be no band tension in the concrete under any conditions. This can be and is accomplished by adding initial stress in the wire of sufficient amount to offset all losses of shrinkage, flow and temperature. The wire is stressed initially to 150,000 psi. instead of the 103,700 psi., thus introducing 46,300-psi. of extra prestress. A 30,000-psi. loss in prestress can now do no harm. The concrete of the full tank would still have 100-psi. compression.

Temperature differences will impart vertical stresses in the side walls which may cause cracking. Such stresses also may be taken care of by prestressed vertical rods or wires. These are stressed sufficiently to compress the concrete vertically to an extent that the damaging vertical tensile stresses are converted into the release of compression.

The use of concrete domes generally accompanies the construction of a prestressed tank. Here again horizontal prestressed wire is used to take the horizontal load thrust of the domes, thus preventing distortion and cracking which otherwise would occur due to rod elongation, shrinkage, and flow. The domes can thus be lightweight and inexpensive. Most of those constructed to date are about 2 in. thick although diameters in some cases have been above 150 ft. An advantage of the dome is the elimination of the columns that are necessary for support of flat slab roofs. Columns cause high stress reversals in the floor system and promote excessive cracking and consequent leakage.

A feature of the wire winding machine is its accuracy of stress measurement. On the new machines there is a hydraulically operated dial that registers, in full view of the operator, the load being imparted to the wire. The stress is constant within close limits, and is changed only by the installation of other stressing units.

Bolivia Undertakes Big Mapping Program

A new Military Geographic Institute, recently authorized by the Bolivia Chamber of Deputies is expected to contribute greatly to the military and economic life of Bolivia by mapping, for the first time on a large scale, strategic zones and areas of productivity scattered throughout the republic.

As approved by the lower legislative chamber, the Institute would be administered and directed by the Bolivian Army. Consequently, one of its most important functions would lie in mapping areas of military importance and in giving Bolivia a detailed knowledge of its geography sufficient for any emergency, military or otherwise.

Specifically, the Military Geographic Institute is authorized to map the country in accordance with standards established by the International Geodetic and Geophysical Union; control and supervise the publication of all maps of Bolivia issued by governmental or non-governmental agencies; assist in fixing national, departmental and provincial boundaries; fix the general triangulation of the country and collaborate with similar institutions elsewhere.

Air-Entraining Cement Concrete Proves Scale Resistant

E. F. Young

Technical Service Manager, Universal Atlas Cement Co.
Minneapolis, Minn.

Contents in Brief—*Minneapolis installed a number of experimental sections of pavement in 1939 in an effort to find a solution to serious scaling troubles caused by salt applications for ice removal purposes during the winter months. After four years service the sections made with air-entraining cement are still sound and free of scale.*

LIKE MANY OTHER CITIES in our northern tier of states, Minneapolis had been confronted with the problem of scaling on concrete pavements for many years. The cause obviously rested with the necessity for using sand or cinders treated with salt (sodium or calcium chloride) for ice removal purposes as well as with the salt used by the street car company to thaw out its switches. Not only was the pavement subjected to the action of salt, but the salt also caused the pavement to undergo many more repetitions of freezing and thawing than it would ordinarily have to withstand. Finally, during the summer of 1939, following a winter during which severe scaling occurred on several newly paved streets, the city paving department decided on an experimental paving project using air-entraining portland cement which had a perfect record, after a winter of severe salt applications, in the experimental road of the Universal Atlas Cement Co. at its Hudson, New York plant. (*ENR* Oct. 10, 1940, p. 471). Now after four years' service, it may be recorded that all of these Minneapolis streets are still free of scaling.

Two streets were selected upon which experimental concrete pav ments were to be constructed: Se ond Ave. N. and E. Franklin Av Both jobs were so located that, i addition to normal street sandin operations, salt used by the Twin Ci Rapid Transit Co. for thawing o switches would also be carried alon the pavement by vehicular traffic.

Layout of the projects

As shown in Fig. 2, three basi experimental sections were adopte on the Second Ave., North projec This layout was selected to give control section as well as sections t determine the comparative resistanc to scaling of various concrete mixe and surface applications as follows

Section 1—Concrete in this sectio was composed of untreated portlan cement and fine and coarse aggregat of average gradation normally pro

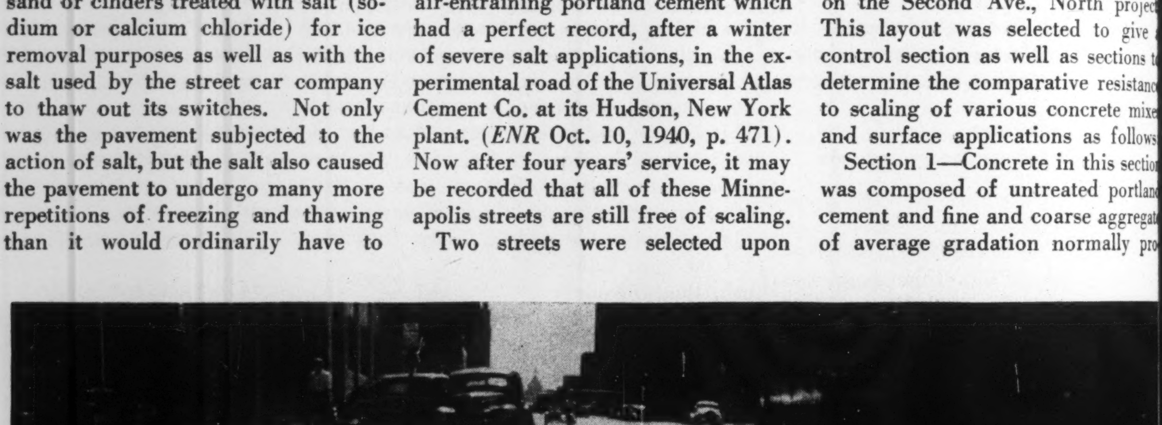


Fig. 1. Four winters of de-icing treatment cause scaling on normal cement paving while strip of air-entrained cement pavement is still sound.

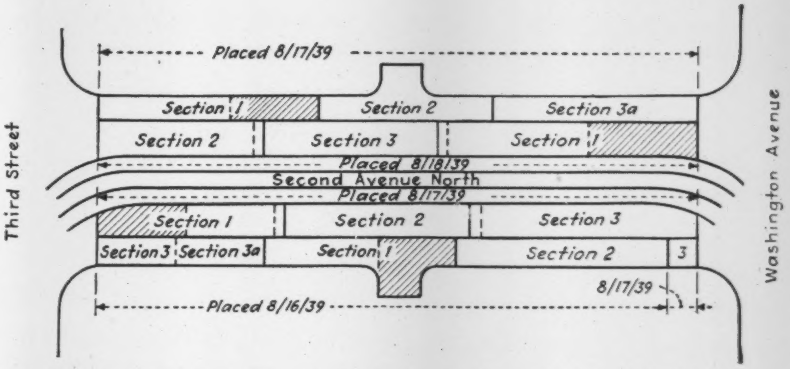


Fig. 2. Second Ave. N. test sections. Resurfacing layer is 5 in. thick. Gutter sections are 6 ft. wide and sections between gutter and car tracks 11 ft. wide. Cross hatched areas are treated with linseed oil.

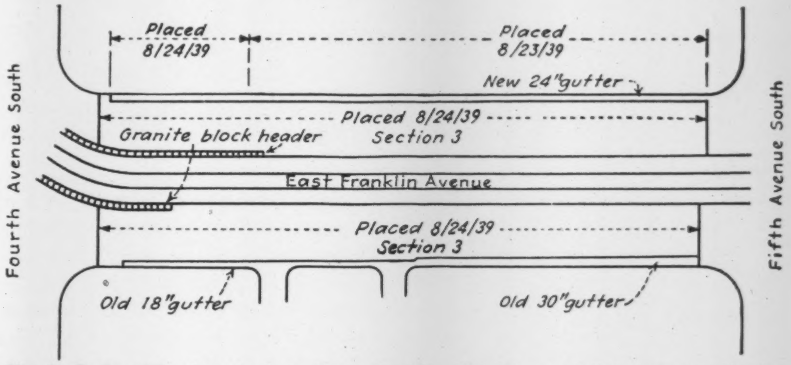


Fig. 3. E. Franklin Ave. test sections. Granite block is used between car tracks.

duced in the Minneapolis area. Half the length of pavement in this section was treated with an application of linseed oil, indicated as shaded areas on Fig. 2. The untreated part of this section was designated as a control section.

Section 2—Concrete in this section was composed of untreated portland cement, coarse aggregate from the same source and of the same characteristics as used in Section 1, and fine aggregate mixed—85 percent of sand used in Section 1 and 15 percent of extremely fine sand having approximately 87 percent passing a No. 50 mesh screen.

Section 3—Concrete in this section was composed of air-entraining portland cement and coarse and fine aggregate from the same source and having the same characteristics as used in Section 1. The air entraining material was Vinsol resin.

Section 3a—Concrete in this section was the same as Section 3, with the exception that it contained 4 percent more fine aggregate and 3 percent less coarse aggregate. Throughout the experimental projects the 3a mix was considered in the same light as the Section 3 mix, and in this article any reference made to Section 3 concrete also applies to Section 3a concrete.

Concrete in all experimental sections had a constant cement factor of 6.0 sacks per cu.yd. A uniform consistency corresponding to a slump between 2½ and 4½ in. was maintained. All construction details pertaining to subgrade preparation, mixing, placing and curing were uniform for all sections.

Test sections were so arranged that as far as possible each section would be subjected to the same severity of salt action. A group of three sections was built in each traffic lane and each gutter lane. The position of sections in adjoining lanes was such that sections in one lane were not opposite similar sections in adjacent lanes. This reduced the probability of one section having a preferred position as far as exposure was concerned.

As shown in Fig. 3, the entire pavement in E. Franklin Ave. was paved with air-entraining portland cement using the same mix as used in Section 3 on the Second Ave., N. project. Both projects were resurfacing jobs, consisting of approximately 5 in. of new concrete placed over an old concrete base from which old wood-block paving had been removed.

Mixes and construction procedure

All concrete was proportioned at the City of Minneapolis central batching plant and delivered to the job in 1½-cu.yd. transit mixers; average delivery time was 15 min. An inspector at the plant determined the percent of moisture in the aggregates at regular intervals and adjusted the wet batch weights and the amount of added water so as to keep the dry batch weights and water-cement ratio at design value. The mix proportions are shown in Table 1.

All concrete was finished by hand. A 2x4-in. strike-off was used on the 6-ft. gutter section, and a heavy template equipped with plow handles and pulling rods was used on the wider sections between the gutter and the car tracks. Long handled wood floats were used on all sections. Final finishing was obtained by pulling a wet burlap drag along the pavement. Seventy-two hours of wet burlap curing was required on all sections.

All mixes were plastic, workable and easily finished. It was noted, however, that Section 3 and 3a mix (made with air-entraining portland cement) was considerably easier to finish and required the least amount of effort to spread and strike off. When concrete for Sections 1 and 2 was being delivered the workmen were kept busy spreading, puddling and spading the concrete, and had very little free time between batches. When Section 3 and 3a concrete was being used the workmen finished spreading, puddling and spading operations much sooner and had considerable free time between batches. It was further observed that there was no "bleeding" or water-gain on concrete mixed with air-entraining portland cement. Notes taken during construction by G. E. Bodien, engineer of tests for the City of Minneapolis, summarized as follows, are of interest:

"Section 1—This was a good, plastic and workable mix which flattened out well without segregation when dumped from the transit mixer. There was, however, a slight tendency for coarse aggregate particles to lose their coating of mortar. There was very little surface bleeding during finishing.

"Section 2—The finishers liked

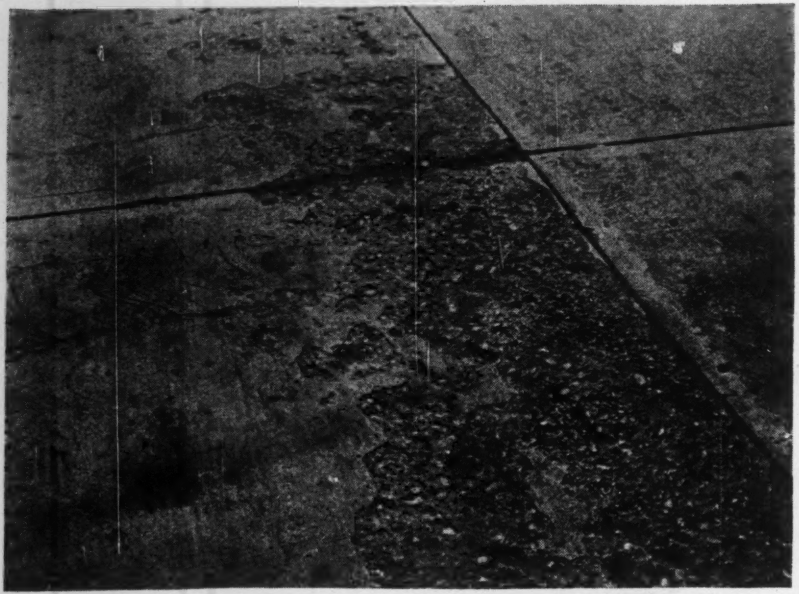


Fig. 4. Close-up of typical scaling after four years of service on section of normal portland cement pavement. Slab in upper right corner is made with air-entraining cement.

this mix and thought it was richer than Section 1. When dumped from the transit mixers the concrete flattened out readily without any segregation and but few particles around the edges lost their mortar coating. The surface floated with creamy wetness with no subsequent water-gain.

"Section 3 and 3a—This concrete was more cohesive than Sections 1 and 2. It flattened out readily when dumped and stone particles remained well coated with mortar. This concrete was easier to finish than either Section 1 or Section 2. The mortar was surface cohesive and formed a roll in front of screeds. Even on an impervious base and in cool, shady locations there was not a sign of bleeding during finishing."

Concrete data

The cement factors and water-cement ratios used in trial batches for the different mixes required very little revision on the job. Average of all proportioning plant and field tests on the two projects are shown in Table 2. It will be noted that the water-cement ratio for the S tion 3 mix averaged 0.25 gal. sack less than for the Section 1 m and 0.39 gal. per sack less than the Section 2 mix. Attention is a called to the difference in the weig per cu.ft. of Section 3 concrete compared to concrete in Sections and 2, and the difference in perce age of air voids. These differenc in weight and percentage of air voi were not as great as was expecte except in Section 3a where the fi aggregate was increased 4 perc and the coarse aggregate decreas 3 percent. Just why this slight vari tion in the proportions of fine coarse aggregate in Section 3a shou result in a lower unit weight and corresponding increase in percenta of air voids is not readily explainab It should be pointed out, howeve that the data given in Table 2 are t average of all field tests, and th only two tests were made to determi the unit weight of Section 3a concret whereas nine tests were made to d termine the unit weight of Section concrete and eleven tests to determi the unit weight of Section 2 co crete.

Strength data

Average test results for Sectio 1, 2 and 3 concrete on the Secon Ave. N. project are given in Tab 3. The paving department had bee advised that the addition of Vins resin to portland cement would resu in a slight reduction of strength. Th results shown in Table 3, as well numerous other field and laborator tests, have proven that this reductio in strength is not serious. Fortu nately, the maximum scaling resis ance is produced by the addition o relatively small amounts of air-en training material. It has been th experience of the writer that engi neers are willing to accept this sligh reduction in compressive strength fo the increased durability offered b air-entraining portland cement an especially for its resistance to scaling

Results of de-icing treatments

Both the experimental pavin projects in Minneapolis have no been subjected to salt action and th numerous freezing and thawing cy cles that occur during four Minne sota winters. An inspection made i the Spring of 1940 revealed that con siderable scaling had occurred o Sections 1 and 2, but there was abso

TABLE 1—PROPORTIONS FOR A CUBIC YARD OF CONCRETE (DRY WEIGHTS)

	Section 1	Section 2	Section 3
Cement	564 lb.	564 lb.	564 lb.
Sand—Regular	1281 "	1035 "	1151 "
Sand—Fine	....	172 "	....
Gravel	2028 "	2098 "	2028 "
Water	275 " (33 gal.)	275 " (33 gal.)	262 " (31.5 gal.)

TABLE 2—CONCRETE DATA

Mix Number	Section 1	Section 2	Section 3	Section 3a
W/C, gal./sack	5.54	5.68	5.29	5.39
Slump, in	2.85	3.45	3.42	3.00
Weight/cu. ft., lb	154.2	153.8	152.0	150.2
Cu. ft./sack	4.49	4.52	4.49	4.54
Theoretical yield	4.46	4.49	4.38	4.38
Air voids, %	0.67	0.66	2.47	3.41
Cement factor	6.01	5.97	6.02	5.95

TABLE 3—STRENGTH DATA ON SECOND AVE. N. PROJECT.

	Compressive Strength lb. per sq. in.		Modulus of Rupture lb. per sq. in.		
	7 days	28 days	7 days	14 days	28 days
Section 1	4761	5585	730	884	907
" 2	4013	5393	720	816	834
" 3	3889	4882	665	827	845

tely no trace of scaling on Section and 3a concrete. On the Second Ave., N. project, where the sections ere so arranged that each of the our mixes would be subjected to he same severity of salt action, the esistance to scaling of air-entraining ortland cement (Section 3 and 3a oncrete) was outstanding.

By referring to Fig. 2, it will be oted that Section 3 is parallel and djacent to Section 2, for a distance f approximately 110 ft., on the south ide of Second Ave. N., nearest Washington Ave. Severe scaling has ccurred in Section 2, but this scalng stops abruptly at the construction oint between Sections 2 and 3. Subequent inspections made in the pring of 1941, 1942 and 1943 howed that scaling had increased n Sections 1 and 2, and also revealed hat those portions of Section 1 which ad been treated with two applicaions of linseed oil were beginning o scale. There is still no indication f scaling on any of the Section 3 r 3a concrete.

Fig. 1, photographed in 1943 after our winters of service, shows to what xtent scaling has occurred in Secions 1 and 2, whereas no scaling ccurs in Section 3. Note how bruptly the scaling stops at the ongitudinal joint.

On the E. Franklin Ave. project where the entire street, with the exeption of 18 and 30-in. gutter placed n 1937, was paved with air-entrainng portland cement, there is no indiation of scaling except on the gutter ection. This pavement is subjected o heavy salt solution carried from a treet car switch at the intersection f Fourth Ave. S. and Franklin Ave., et there has been no disintegrating ffect on the concrete made with airntraining portland cement.

The results of this experimental ork conducted by the paving department in the City of Minneapolis were so convincing that air-entrainng portland cement is now generally sed for street and alley paving, curb nd gutters, and for any other concrete which may be subjected to salt ction. Also, as a result of this work nd some experimental work of its wn, the Twin City Rapid Transit Co. has adopted the use of air-enraining portland cement for all carrack paving.

The experimental concrete pavement projects in Minneapolis were nstalled under the direction of Fred T. Paul, city engineer. Actual construction came under the supervision of Hugo G. Erickson, paving engineer. The experimental car-track paving was installed under the direction of O. F. Moore, engineer of maintenance-of-way, Twin City Rapid Transit Co.

Bearing Pressures for Circular Plates

M. W. Rosentein

Chicago, Ill.

Bearing pressures under circular base plates can be determined quite readily as long as the resultant loads remain within the kern of the full section. However, when the eccentricity becomes greater than this kern distance, the computations become more involved and much time can be saved by resorting to diagrams of the accompanying type.

This chart was prepared by utilizing the convenient properties of the kern, and is applicable for all loads where the eccentricity is between 0.25 and 0.588 or where the point of zero stress varies from 0 to 1.0, in terms of the radius. The use of the kern results in a simplification, as the solution may be made with one less variable than would be the case if the usual procedure were followed. Since the values of c and z were determined for a radius of unity, I_L must be multiplied by R^2 in obtaining the maximum bearing pressure

$$\left(P = \frac{Pc}{Rc}\right)$$

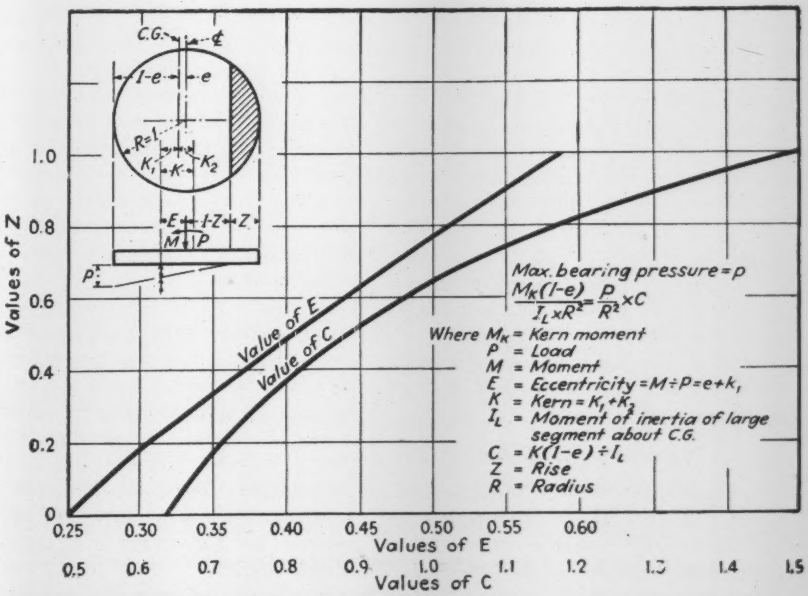
To illustrate the use of the diagram, assume P equals 800 kips, M 1,000 foot-kips, and R 30 in. then the eccentricity, $E_1 = \dfrac{1000 \times 12}{800 \times 30}$ = 0.50 and from E the value of z is found to be 0.77. From z obtain C of 1.14.

The maximum pressure

$$p = \frac{800 \times 1.14}{30 \times 30} = 1013 \ \#/\square''$$

The point of zero stress = 0.77 × 30 = 23.1 in. (from edge).

A chart similar to the one prepared by the writer was used to good advantage in the engineering department of the South Park Commissioners (now the Chicago Park District) in the design of the column bases and masonry plates for the approaches to the Outer Drive Bridge in Chicago. However, as it was based on the customary flexural formula (p = P/A + My/I), an additional curve was necessary, as values for direct stress as well as for bending were required in the solution.



Bearing pressures for circular plates eccentrically loaded may be obtained quickly with this chart.

ENGINEERING ABROAD AS SEEN BY ENR EDITORS

'Way Down the Rio Doce Valley

Edward J. Cleary
Managing Editor, Engineering News-Record

***Contents in Brief**—One of the major war projects in Brazil is the development of the Itabira iron ore deposits in the Rio Doce valley. North American engineers and contractors are prominently identified with the work, which involves railroad rehabilitation, mining operations, port construction and environmental sanitation activities. This is the first story of the project and the men who are working on a strategic behind-the-front supply area.*

NO HEADLINES have appeared about the Rio Doce valley in the dispatches of the battle against the Axis, but it is figuring, nevertheless, as one of the strategic behind-the-front areas of supply in Brazil, from which materials for the weapons of victory are emerging.

To chronicle what goes on here, is to add another chapter on the role of the engineer on the far-flung fronts of global warfare. As evidenced in recent articles by my colleagues, Waldo Bowman, Harold Richardson, and A. N. Carter, engineers and construction men in foreign theatres of operation frequently are engaged on tasks, the importance of which are overshadowed by the spotlight that properly must be focused on front-line fighting.

It is my privilege to tell about one of these jobs whose locale is far from the sound of enemy guns, but on whose successful prosecution depends in part how soon these guns will be silenced.

Potentials and problems

The Rio Doce valley, which lies 225 miles north of Rio de Janeiro, is a natural corridor from the sea to what is believed to be one of the largest and finest deposits of hematite iron ore in the world. The amount is measured in billions of tons, and the quality is evidenced from ore analyses that show a consistent average of 68.5 percent ferric oxide, 0.16 percent phosphorus and silica under 1 percent.

But this is not all. In addition the valley contains vast mica deposits and is a source of rock crystals. To make all of the strategic materials quickly available to the Allied war cause is a problem to which North American engineering skills have been applied.

The job includes the rehabilitation and extension of a meter-gage railroad some 400 miles in length, completion of ore-loading port facilities at Victoria, and the establishment of large-scale mining operations at Itabira. The latter calls for installation of mining equipment and a crusher plant as well as the construction of housing, water supply and sewage disposal facilities.

All phases of the engineering work on the Rio Doce project are being carried out under the direction of Parsons, Brinckerhoff, Hogan and MacDonald, consulting engineers of New York, for whom the late Sam Marshall, formerly chief engineer of the Pennsylvania Turnpike Commission, acted as resident manager and chief engineer until his death in November of this year.

Vitally important to the success of the project is the establishment and maintenance of health throughout the valley. The region is one in whi
malaria runs rampant, and many
the towns through which the railro
passes lack even the most elementa
water supply and sewage dispos
facilities. To this specialized task
providing sanitation measures, the
fice of the Coordinator of Int
American Affairs has assigned en
neers and doctors.

Railroad reconstruction

Claiming first priority for attenti
on the Rio Doce project, is the
habilitation of the Victoria and Min
Railway which, for almost half a ce
tury, was used by an English compa
for the transportation of lumber a
gold from the valley to the seapo
town of Victoria.

A single track, meter-gage road,
is of light construction with 40 a
55 lb. rail, with bridges designed f
locomotives having an axle load of
tons, and a roadbed characterized
heavy grade and sharp curvatur
Lack of compensation of grade on t
curves increases further the difficu
ties of moving heavy ore trains. T
worst conditions are found on the 9
mile stretch between Victoria a
Colatina.

Furthermore, previous traffic d
not justify proper maintenance, pa
ticularly evidenced on some of t
curved sections where half the head
the rails has been worn away.

The rehabilitation program i
cludes relocation of about 100 mil
of the system to secure better line a
grade, improvement of much of t
existing roadbed with new ballast, i
stallation of spiral curves (which we
not used on the original layout), a
the replacement of badly worn ra

h 70-lb. rail (had there been no ority difficulties, 80 lb. rail would e been used). In addition, a num- of new freight stations, mainte- nce shops and engine watering ilities have already been built. The cation work is in charge of Eugene aw, who represents the consultants.

Work has been going on for about o years using Brazilian contractors, st of whom are almost entirely de- ndent on hand labor, which is not o plentiful. Progress has been irri- ingly slow on the work, the scope of ich calls for use of heavy construc- n and earth-moving equipment.

As a result, last October a contract r the work was signed jointly with e Morrison-Knudsen Co., Inc., of ise, Idaho, and The Raymond Con- te Pile Co. of New York to take er the relocation at a cost of about ,000,000. These two companies have rmed a corporation known as the Companhia Raymond, Morrison- nudsen do Brasil, S.A.", of which . G. Kennedy is vice-president and neral manager. Mr. Kennedy for- erly was project manager for the orrison-Knudsen Co. on the con- ruction of the Dale Hollow Dam in ennessee.

This action was not prompted by y dissatisfaction with the quality of ork being done by the local con- actors, but was necessitated simply get the job completed and thus eed the movement of ore abroad. razilian contractors, like many of eir North American colleagues, can- ot buy construction equipment be- ause of the war, and furthermore ey are faced with severe shortages in anpower.

Railroad engineering data

Some details on the engineering hases of the railroad work were rnished in the field by I. R. Mulvey, ivision engineer of construction,, ho formerly was engaged with the onstruction division of the Baltimore Ohio Railroad.

He pointed out that all curves over degrees were being spiralled, the dopted transition rate being one de- ree for every 76 ft. (20 meters). On ertical curves, for every 1 percent lgebraic difference in grade, a 500 ft. ength of curvature is used. Maximum rades are held to 2.30 percent, with ompensation of 1.18 applied on the est or empty haul, and 0.5 on the ast or loaded, down-haul slope. Where ew rail is laid the ties are spaced to include 2,880 ties per mile of track.

When going through rock, the width of cut is 14.5 ft., and the sides are trimmed vertical. On earth cuts, the width is the same, but the sides are sloped 1 to 1½; in places where machinery can be used both types of cut are widened to 20 ft. All fills are built to a width of 13 ft. on top. Biggest cut on the job is 66 ft., and the grading

ENR staff photos

Fig. 1. To the Brazilian version of "I'se been workin' on de railroad," this track gang on the Victoria-Minas Ry., poles its weary way homeward.

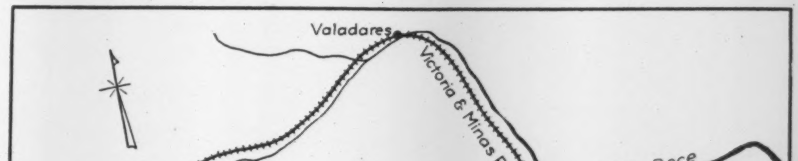


Fig. 2. Route of the Victoria-Minas Railway in Brazil, which climbs to an elevation of 2,400 ft., most of this in the last 68 of its 400 mile length. Bad grades and poor alignment called for reconstruction to facilitate ore movements.

Traveling Along th

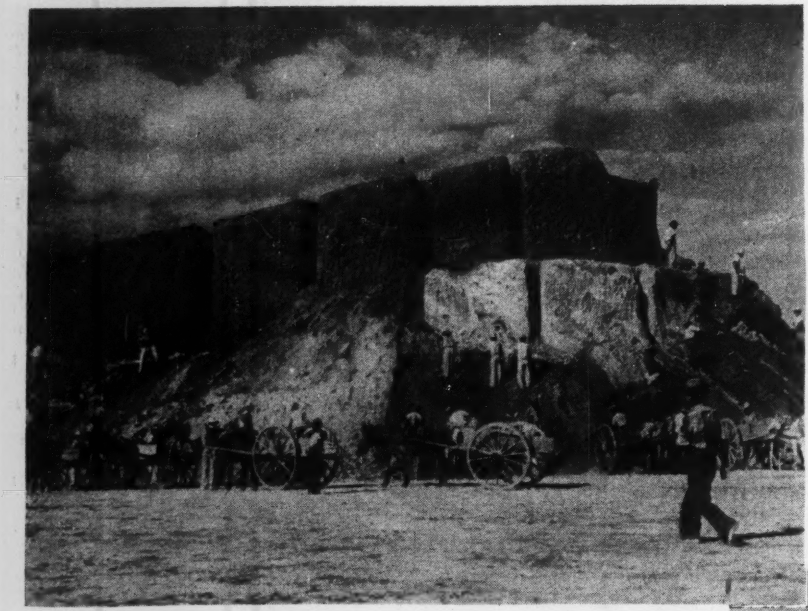


Fig. 3. Methodical hand labor methods characterize earth moving operations. First a series of parallel vertical slots are made with pickaxe and shovel to a depth of about 3 ft. Then the slab of earth between slots is pried loose from the top, using for this purpose long wood poles. When the consolidated block of material is pushed out far enough, gravity forces come into play and the block crashes down to completely disintegrate.

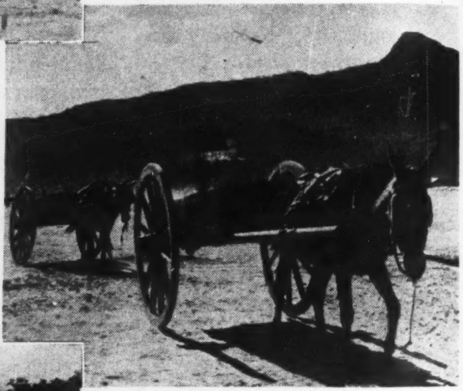


Fig. 4. Driverless, the indefatigable and intelligent burros return with their wagon for another load of fill to be carried to the dumping area. In the right background, is a mountain of iron ore.

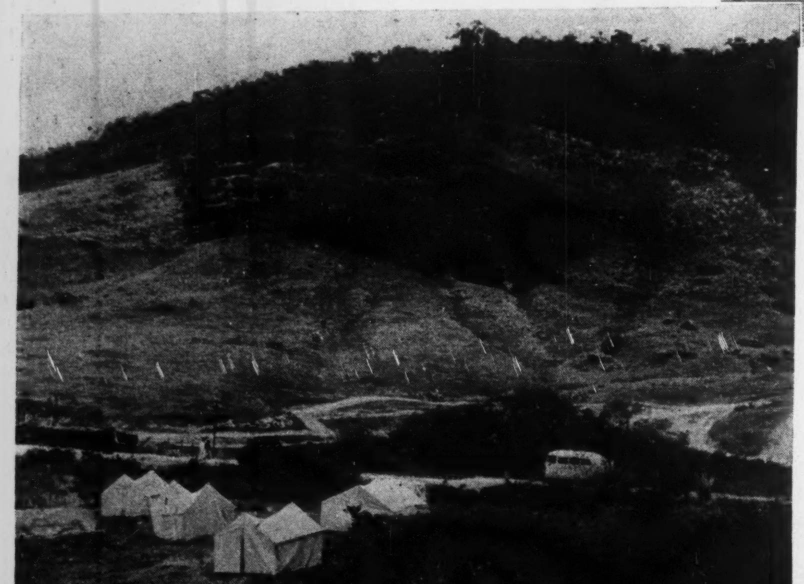


Fig. 5. A railroad surveyors camp in the lower Rio Doce valley, where relocation work is under way. On the track (right) can be seen the "Buda," a modernistically styled, gas-driven inspection car.

oute of the Victoria-Minas Railway in Brazil

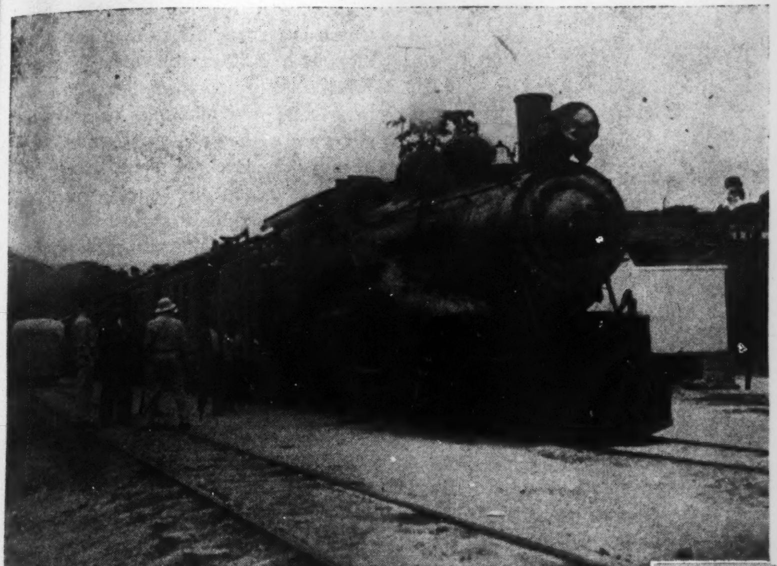
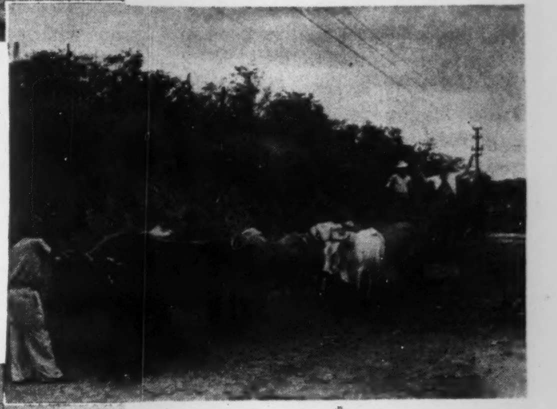


Fig. 6. The paymaster's train, drawn by one of the newer locomotives on the line, has the right-of-way and the "Buda" (left), with its inspection party was sidetracked at one of the way stations for an hour.

Fig. 7. Another type of "train" frequently seen along the railroad. This oxen team hauled fuel for the locomotives, all of which are woodburning.



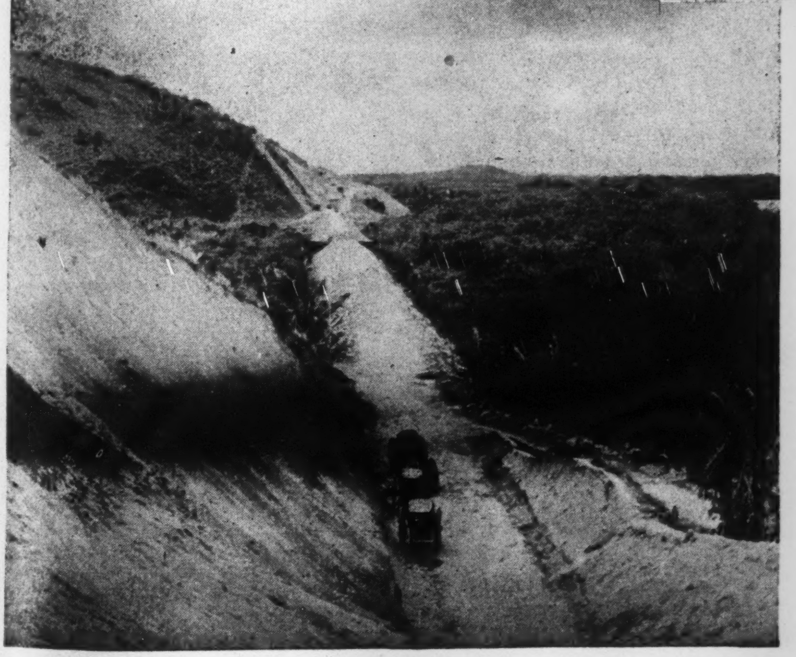


Fig. 8. One of the cut-and-fill sections on the railroad relocation, on which hand labor methods are being used. Width of cut is 14.5 ft. and the sides are sloped 1:1½. Fills are 13 ft. wide on top.

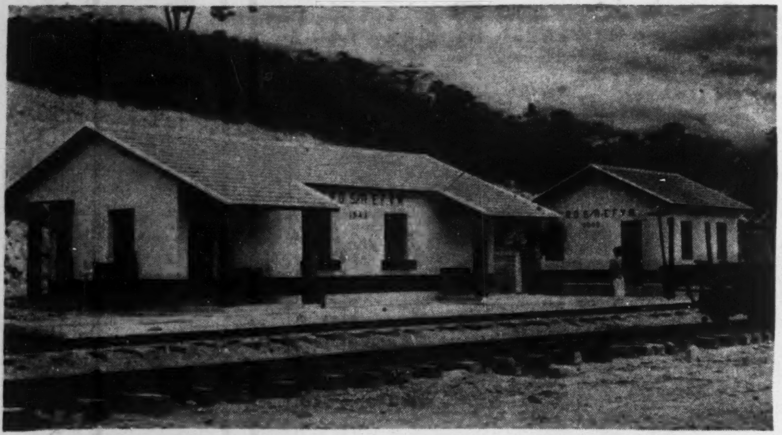


Fig. 9. Rehabilitation of the railroad includes the construction of stations such as the one above, located at 10 mile intervals. There are no block signals on the road, which is single track, and at each station a turnout track is provided where trains must wait until clearance is secured.

averages about 63,000 cu.yd. per mile.

Studies have been made for the reconstruction of bridges, designed to carry an E-50 loading. Already some 5,000 tons of steel bridge sections fabricated in the United States have been shipped to the job. These spans, which vary in length from 36 to 134 ft. include plate girders, deck and through-truss sections.

To supplement the existing rolling stock, much of which dates back two or more decades, and is not suitable for heavy ore movement, 250 bottom dump ore cars of 55 ton capacity have been purchased along with eighteen Mikado locomotives. The latter, weighing 110 tons and 58 ft. in length, are of the 2-8-2 type and have a tractive effort of about 25,000 lb.

Portuguese railroad tables

Illustrative of the minor, but nevertheless real, difficulties faced by North American engineers in foreign service, was the story related by R. D. Gladding, assistant to the chief engineer of the consultants office.

Mr. Gladding, formerly a consulting engineer in Wilson, N. C., is supervising the railroad engineering operations. Nowhere in Brazil could he find a set of field tables based on the metric system. Some French tables were available, but they were of little help because among other things the degree of curve in French practice is defined as the deflection angle of a chord of 20 meters, and not the angle subtended by a chord of 20 meters. Furthermore, he could find no texts in Portuguese describing theory and practice of the railroad spiral curve that could be used by his Brazilian field engineers.

"Much as I shuddered at the thought," said Mr. Gladding, "I had to sit down and write a short treatise on the spiral curves and then convert a lot of U. S. tables to the metric system. After one of my bilingual Brazilian friends translated all of this into Portuguese, we had it typed on small pieces of tracing cloth and made a lot of blueprint copies. Bound together in a book, this little manual of tables and field practice has saved us many a headache."

GETTING OUT THE ORE

Railroad reconstruction is only one element of the Rio Doce project, however. The most dramatic operations are to be witnessed at Itabira, the terminus of the road.

Here you see part of the most fabulous deposits of iron ore in the world—variously estimated from ten to fourteen billion tons—and you are carried away with the feverish activity that marks the establishment of a big-time mining operation.

To reach Itabira, the railroad has climbed to an elevation of 2,400 ft., most of this within the last 68 miles, and you get off at the train-marshalling yard now being leveled and covered with track. Ahead stands the conical-shaped mountain that you have been watching from the ore train for the last hour as it struggled up the steep, winding grade.

Near the top of this mountain, which is virtually pure iron and rears its peak to 4,500 ft. elevation, you can faintly see a benching operation. Up here they are blasting away at the silvery gray hematite ore, which averages 68.5 percent ferric oxide. In order to reach this spot you travel over a dirt road that spirals up the sides of the mountain. Frequently your car pulls over to the side in order to permit the passage of trucks that are skidding downward to the railhead with loads of ore.

Finally you reach the benching site. At present it is serving as the principal point for ore extraction, an operation that involves nothing more complicated than drilling and blasting. From this windswept perch, C. Alvin Lorenson, a Michigan mining engineer and managing director of the mine, points out what is going on.

Some 600 ft. below, construction was proceeding on a primary crusher plant and the head tower for a conveyor system. The latter, a 36-in. endless rubber belt with a length of 7,000 ft., will carry the crushed ore down further into the valley to a secondary crusher plant and then to rail loading bins.

The primary crusher is a 48-in. gyratory unit. The secondary crusher plant includes two 20-in. gyratory machines and $\frac{1}{2}$ x 3 in. vibratory screening equipment.

Other equipment for the mining operations, all of which was purchased in the States and is now on its way, includes two 4-yd. electric-driven power shovels and one diesel $1\frac{1}{2}$-yd. shovel, twelve 35-ton diesel-operated trailer trucks, and three 1,000-cu.ft. air compressors along with drilling tools.

One special feature of these ore trucks—a hydromatic arrestor to check speed—commands attention because it solved the problem of controlling the descent of the 35-ton loads on a grade that averages 6 percent. Experience indicated that a standard brake system would have a very short life and the engine itself would be needlessly worn by operating at high speeds in low gear. This led to the adoption of an arrestor developed for use in oil drilling, but only recently applied to trucks.

The device consists of a metal housing containing a fin-shaped rotor; the

On the Site of Iron Ore Mining Operations at Itabira

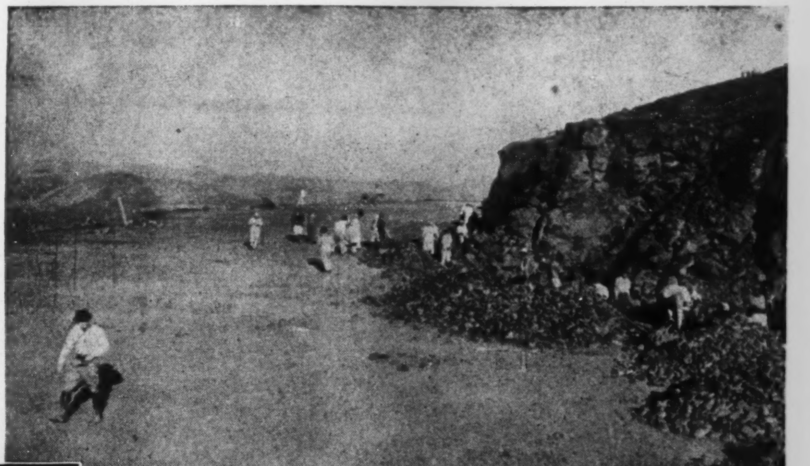
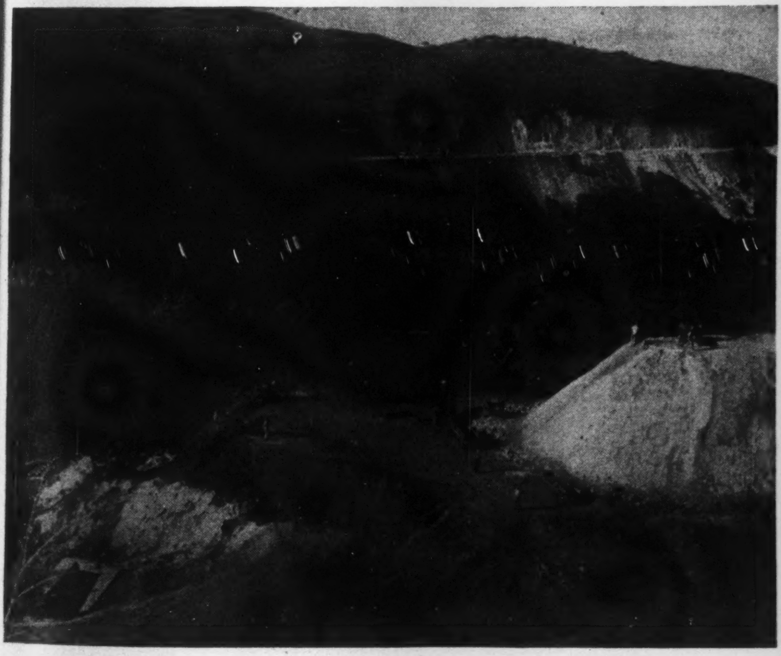


Fig. 10. Near the top of the 4,500 ft. mountain of iron, a bench has been formed by blasting down the ore. Here the ore is broken into small pieces and then moved by truck to the railroad in the valley. Construction is now being pushed on the installation of a 7,000-ft. rubber-belt conveyor system and a crusher plant.

Fig. 11. I. R. Mulvey, division engineer of railroad construction, and C. Alvin Lorenson, managing director of mine operations at Itabira. Mr. Mulvey formerly worked for the Baltimore and Ohio R. R., and Mr. Lorenson is a mining engineer from Michigan.

Fig. 12. Near the foot of the mountain a big fill is being made for an extension of the railroad to the site of the ore crusher plant.



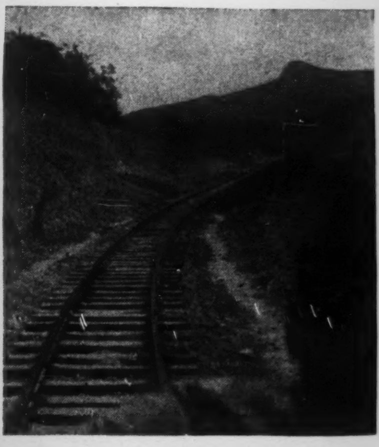


Fig. 13. From the rear of a loaded ore train leaving Itabira, the towering height of the mountain of iron gives adequate assurance that there are ample reserves for the future.

Ore-loading Facilities At Victoria

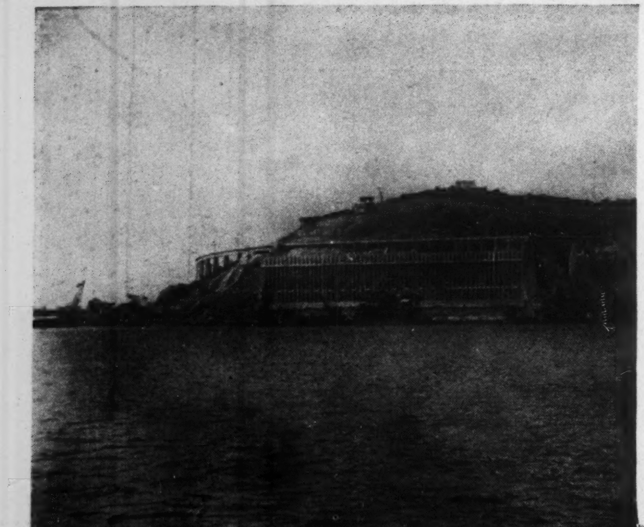


Fig. 14. Looking across the harbor at Victoria where the ore trains will be brought on a loop track directly over the concrete storage bunkers.

Fig. 15. Conveyor loaders will facilitate the movement of the ore from the storage bunkers into the holds of waiting ships. Each conveyor has a capacity of about 500 tons per hour.

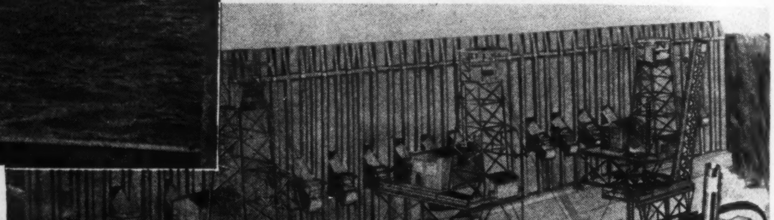
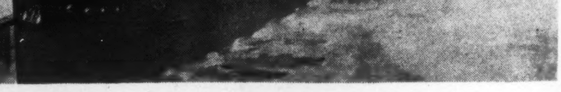


Fig. 16. Storage bunker construction details. The natural slope of the rock outcrop forms the back wall of the bunkers.

Fig. 17. Reinforced concrete monoliths support the trestle that carries the loop track to the top of the bunker.



ousing itself also is provided with n spokes, opposing those of the rotor. his device is coupled to the drive haft of the truck, and when water is dmitted between the opposing fins it etards movement of the rotor ele-ent. The resistance of the water cre-tes heat, which is dissipated through irculation in the radiator of the truck. he arrestor is said to check the speed o any desired range between 10 and 0 miles an hour, without the applica-ion of brakes.

Housing for the workers

In another part of the valley could e seen the partial completion of a orkers' village to house 1,500 people. ome 30 houses for families were al-eady constructed, as were two dormi-ories for single men, each of the lat-er accommodating 36 men.

In contrast to the adobe thatched-oof single-room huts that predomi-ate in this area, the workers' houses epresented a far departure toward a igher standard of living. They were onstructed of brick made on the site, rovided with tile roofs and contained itchen, shower and toilet facilities. urthermore, a plot of ground adja-ent to each house was provided for se as a vegetable garden.

Water for the village is to be piped from a nearby mountain stream, fil-tered and chlorinated. Sewage will be treated in a central, septic tank in-stallation.

"And over there," said Mr. Loren-son, pointing to a reddish brown strip of flat cleared ground near the work-ers' village, "is our airport. From here I can fly over the mountains to our central office at Bello Horizonte in 35 minutes, a journey that takes eight hours by train and twice as long by auto."

About 2,500 ft. long and 300 ft. wide, the runway has been built with a fill of sand-clay material containing a large percentage of ferric oxide particles. The latter, with its characteristic red color, makes the runway easily identifiable from the air. And since this is the only airfield in a mountainous district traversed by commercial planes, it has already achieved popularity as an ideal spot for emergency landings. Incidentally, the runway was sloped downward at a grade of one percent into the direction of the prevailing winds in order to provide opportunity for accelerated takeoffs.

Ultimate production of ore at Itabira is expected to reach 1,500,000 tons annually. At present, however, production is handicapped by the lack of adequate railway, mining and loading facilities, with the result that this year's production will amount to less than 180,000 tons. Last year the production was about 60,000 tons.

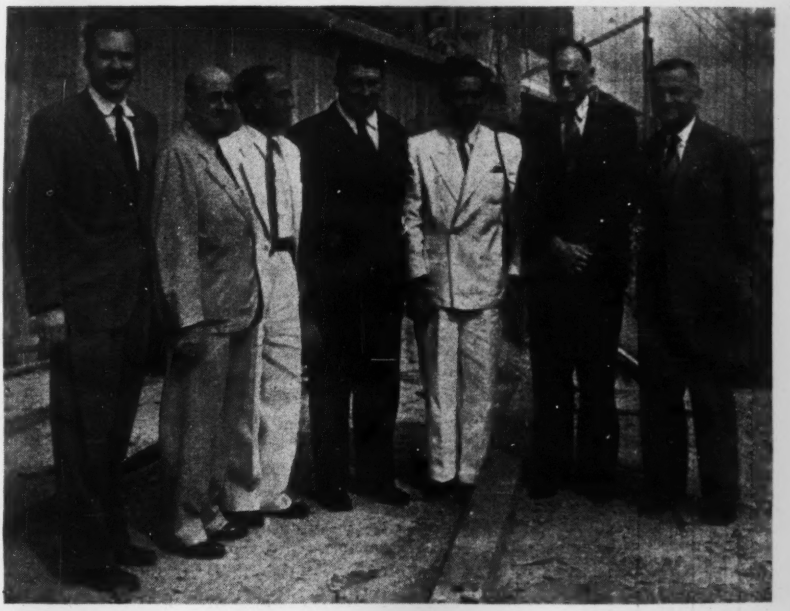


Fig. 18. Some of the engineering personnel on the Rio Doce project. From left to right: Dr. Heitor Tameirao, sanitary engineer; Dr. Joachim Ottoni, superintendent of the V.-M. Ry.; Dr. Ewerton Silva, assistant engineer, port facilities section, Compahania Vale do Rio Doce; Frank Foley, construction engineer, Parsons, Brinckerhoff, Hogan and MacDonald; Dr. Eumenis Guimaraes, chief engineer, port facilities section, C.V.R.D.; R. D. Gladding, assistant to the chief engineer of of the P. B. H. and M. firm; and Dr. Alencar Araripe, chief engineer, V.-M. Ry.

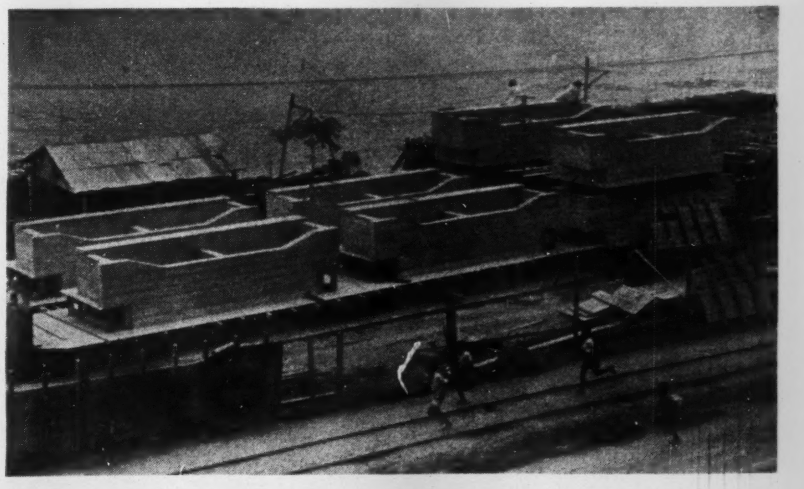


Fig. 19. Precast concrete box sections, which are used for the girders of the ore-loading wharf. Prefabrication minimizes underwater form work as well as concrete placement. Some of the units weigh as much as 36 tons.

Ore-loading docks

Ironically, the ore loading facilities at the seaport of Victoria, which are being rushed to completion to aid in the defeat of the Nazis, were put under construction in 1938 by a German firm of engineers and contractors who were interested in the Itabira ore deposits. But before they had completely finished construction of the concrete bunkers, designed for 47,000 tons of storage, war had been declared and they abandoned their work.

Neither the Brazilian nor North

American engineers were particularly happy with what they inherited, however, because it has been discovered that the bunkers will not fully function on the gravity flow principle for which they were designed. And the gravity flow capacity is only about 22,000 tons.

The design was based on the use of a granitic rock outcropping that rose steeply from the water's edge. By simply erecting a reinforced concrete front wall at the toe of the slope and then adding end walls bunkers were formed, utilizing the natural slope of the rock for the back wall.

Since construction had been far advanced on the bunkers it was necessary to complete them on the basis of the original design and install conveyor loaders. The loaders, three in number and each with a rated capacity of 400-600 tons per hour, will be electrically operated.

As shown in the photos, the ore cars can be "spotted" directly over the bunkers by means of a loop track layout. After being unloaded, the cars are then released and roll by gravity to a switching yard for return to the mines.

The tracks and switching yard are completed and conveyor equipment is now being installed. Meantime, wharf construction is under way. This, too, is of reinforced concrete, the girders and beams being precast in order to minimize underwater construction.

Concrete columns for supporting the wharf are founded on a rock bottom, holes having been blasted out to secure a firm footing. On top of these columns, many of which are below the water surface, are placed the precast units. Some of these weigh as much as 36 tons.

While waiting for the completion of these facilities the ore reaching Victoria is unloaded by hand and then swung aboard ships with cranes.

HEALTH AND SANITATION

After I had ended my field inspection of the Rio Doce valley work, the president of the Companhia Vale do Rio Doce, Dr. Israel Pinheiro, very thoughtfully provided a small plane for my transportation from the mine to the city of Bello Horizonte, where his offices are located.

This 35-minute air trip saved about a day of traveling time crossing the mountains by train and gave me opportunity for an early audience with a dynamic and broad-visioned personality. Dr. Pinheiro made it clear that while present emphasis in the valley is on iron ore and mineral production, this did not mean that no thought is being placed on an overall regional development. In this respect, he pointed out, health and sanitation measures assume basic importance.

Dr. Pinheiro was most optimistic about the progress that had already been made in malaria control, and with a twinkle in his eye, he said, "Mosquitoes are the only thing that are leaving this place since money has come in." It was not difficult to interpret this remark as a tribute to the work being done by the Health and Sanitation Division of the Office of the Coordinator of Inter-American Affairs.

In a million-dollar cooperative program, toward which the Brazilians have contributed $200,000, the Coordinator's Office has tackled a job of public health engineering involving temporary and permanent control of mosquito breeding, installation of simple water supply and sewage disposal facilities, sanitary location, construction and inspection of railroad labor camps, installation of experimental low-cost housing, and the construction and operation of dispensaries and health centers.

This project is one of several cooperative sanitation undertakings in Brazil operating under the Ministry of Health and known as the Servicio Especial de Saude Publica (S.E.S.P. —pronounced Sespee). Sanitary engineers and medical doctors, many of whom have been assigned to this work from the United States Army under an arrangement with the Coordinator's Office, are engaged on the program.

Overall direction of the engineering activities in Brazil is furnished by H. G. Baity, chief engineer of S.E.S.P. who is on leave of absence from his post as professor of sanitary engineering at the University of North Carolina. Capt. Jean Rogier, a medical man, is chief of the Rio Doce project, and C. Heard Field, formerly with the Georgia State Health Department, is principal sanitary engineer.

Illustrative of the activities S.E.S.P. is the work being done at t town of Governador Valadares, h way up the Rio Doce. An importa rail center for iron ore operations well as the hub of the mica mini operations of the Metals Reserve C poration, this town has a populati of 6,000, double what it was a ye ago; continued growth to 12,000 expected within the next five yea

Here two sanitary corps office Maj. George Eagles (formerly wi the Ohio State Health Departmen and Capt. John Bumstead (previous with Gannett, Fleming and Eastma and also the Tennessee Valley A thority), are developing a well su ply and reconstructing an antiquat distribution system now supplied wi water from the polluted river.

Equally important are their effo at providing sewage disposal faci ties, which were virtually non-existe in this town. Their plan is to sew only the more densely populated ar adjacent to the river, and to bui bored-hole latrines for the balance the population. This is a realistic a proach to the situation because fun are limited for construction, a furthermore it recognizes the fund mental fact that even with sewe available to every house, few residen could afford the installation of wat closets and plumbing to use them.

To point the way to better housin these two engineers have also bui about a dozen low-cost houses. T serve purely as a demonstration what can be done with local materia and labor, these houses are rented a nominal figure to native employe of S.E.S.P. Thus, friends and neig bors, many of whom live in rathe crude, adobe huts, have been stim lated toward the improvement of the own quarters.

Malaria control program

One of the most significant contr butions to improved health standar in Valadares was the construction of small hospital and dispensary buil ing. How far the fame of this tin health institution had spread was ev denced by the following story told t me by the doctor in charge.

One afternoon a 16-year-old ema ciated and fever-ridden boy stumble into the dispensary seeking treatmen for malaria. After he had receive medical attention and food, the docto learned that the lad had walked 5 miles from an isolated village, th

Temporary and Permanent Living Quarters for Workers.

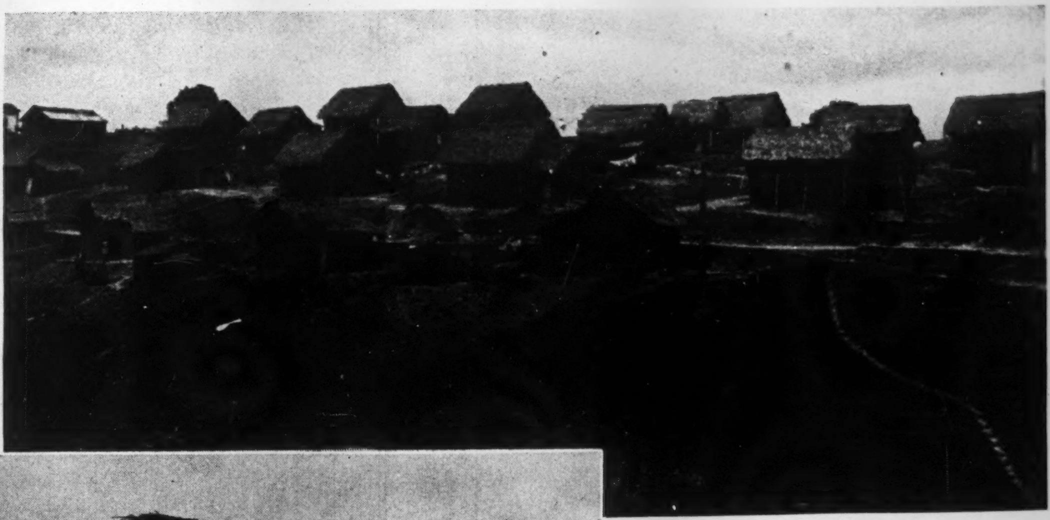


Fig. 20. Temporary housing furnished by Brazilian railroad contractors for workers and their families. The frame is a lacework of poles and reeds plastered with clay; the roofs are thatch. Most homes have only one room, which serves for both living accommodations and cooking facilities.

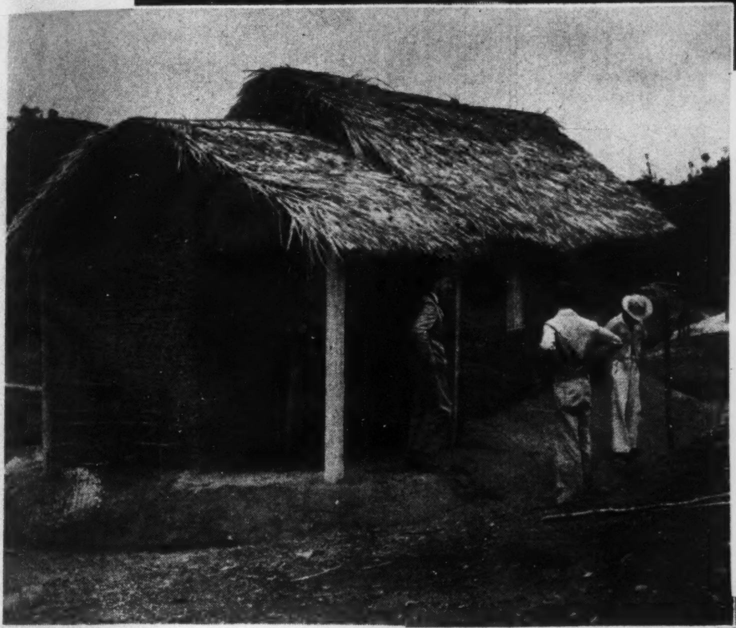


Fig. 21. This is the "model house" designed by American sanitary engineers for temporary camps. Native construction practice was followed, the major improvement being the small extension at the left to provide a place for food preparation apart from the living quarters.

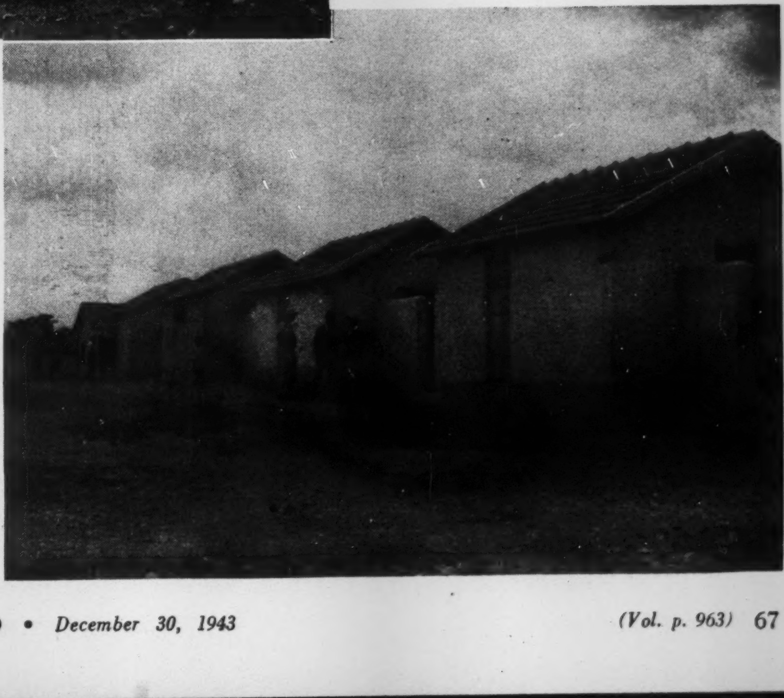


Fig. 22. A demonstration project of permanent type low-cost houses at Valadares, a boomtown in the valley.

Sanitation Plays a Vital Role In the Rio Doce Valley

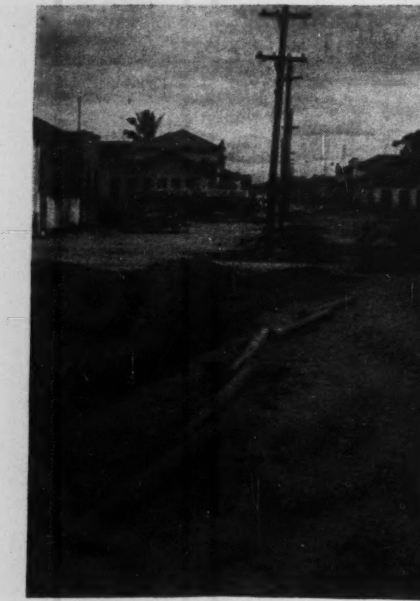


Fig. 23. A simple distribution system for water supply ranks as the basic need in many of the towns.

Fig. 24. A realistic approach to the problem of sewage disposal small villages is the construction of bored-hole latrines (see E Oct. 7, 1943, p. 551). Below is shown a fabricating yard where c crete slabs are made for this type of latrine.

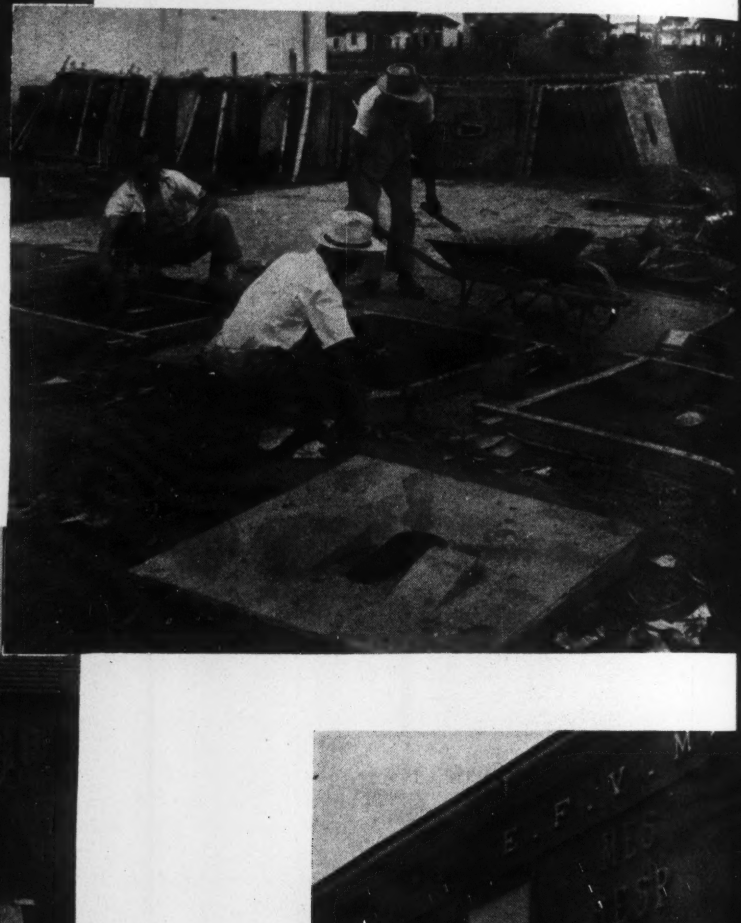


Fig. 25. Water tank and river pumping station that now attempts to serve a town of 5,000. This will be supplanted with a well supply, modern pumping and storage facilities.

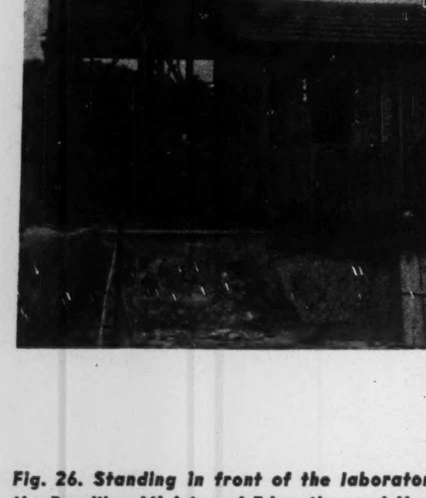


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Fig. 26. Standing in front of the laboratory railroad car assigned by the Brazilian Ministry of Education and Health (M.E.S.) to the sanitary mission of the U. S. Coordinator of Inter-American Affairs (S.E.S.P.) are: Capt. J. C. Bumstead, sanitary engineer at Valadares; E. J. Cleary, managing editor of Engineering News-Record and engineer-consultant to the Coordinators office; and C. Heard Field, principal sanitary engineer, Rio Doce project.

trip taking four days, during which he was prostrated every few hours with violent chills and fever. In answer to the question how he learned that aid was available at Valadares, the boy seemed surprised and replied, "Everybody in the valley knows about S.E.S.P. and the help they give for the asking."

At Valadares, as well as in many other places throughout the valley, eradication of malaria mosquito breeding places is a major challenge. Repeated surveys have established that *Anopheles darlingi* is the principal vector for the transmission of malaria, and laboratory studies have been focused on the biology of this species as well as the determination of its environmental preferences. Meantime, much permanent ditching and related drainage work have been instituted in populated areas, along with an intensive anti-larval spraying campaign using Paris-green.

Along the railroad are fourteen medical posts for malaria prophylaxis and treatment, handling about 1,600 patients a month. Atabrine tablets are said to be successful, both as a treatment and preventive, and these are distributed free, the monthly distribution totaling more than 12,000 tablets.

In addition to this medical phase of the railroad reconstruction operations, S.E.S.P. also renders assistance to the contractors in the selection of suitable sites for labor camps. About 18 construction camps have been established, generally located on high ground or otherwise drained to eliminate mosquito breeding, and they are provided with bored-hole latrines; the latter are particularly useful in minimizing the transmission of hookworm.

Progress is now being made toward the installation of simple water systems to eliminate the present use of streams that are sources of schistosomiasis infection.

This, in brief, outlines the health and sanitation program in the Rio Doce valley. Designed to yield immediate benefits in the prosecution of the war effort, at the same time the very nature of the work is such as to be productive of permanent results.

To the people of the valley, unused to cope with abstractions, the donor of an atabrine pile and the purveyor of pure water are demonstrating in fact the meaning of the "good neighbor policy."

BEHIND THE RIO DOCE PROJECT

The Rio Doce project, of which undoubtedly more will be heard in the years to come, had its genesis in an agreement reached by three governments—Brazil, Great Britain and the United States—on March 3, 1942.

Prior to this time the U. S. Export-Import Bank had been engaged on the problem of financing the development of Brazilian mines to increase ore shipments to Great Britain and the United States. This terminated in a meeting of representatives of the three countries, who signed an agreement with these terms:

1. The British Government would acquire and cede to the Brazilian government the property of the Itabira Iron Ore Co., Ltd., a private capital, English enterprise.
2. The Brazilian government would pay all expenses in Brazil for the development of the mines and for the reconstruction of the railway, to produce and transport 1,500,000 tons of ore annually;
3. The Brazilian government would give to the British government and to the Metals Reserve Corp., a U. S. government agency, preferential rights for the purchase annually of 750,000 tons of ore each during a period of three years following the date of a purchase agreement to be made with the Brazilian government;
4. The Export-Import Bank agreed to provide a credit of $14,000,000 for the payment of technical services and for the purchase in the United States and shipment to Brazil of the equipment and materials necessary for the development of mines and for the reconstruction of the railway as stipulated. The funds advanced were to be repaid with interest from the sales of ore during a period of 25 years.

To carry out its undertakings, the Brazilian government caused to be formed the Companhia Vale do Rio Doce (the Doce River Valley Co.) with a Brazilian president and four directors, two of whom were to be Brazilians and two Americans. And pursuant to the agreement of March 3, 1942, the Export-Import Bank signed a loan agreement in March, 1943, by which the credit of $14,000,000 was made available to the company.

The C.V.R.D. is capitalized at $10,000,000, of which $4,500,000 is in 6 percent preferred stock that has been sold to the Brazilian public, and the balance is in common stock held by the Brazilian federal government.

Although present activities are concentrated on war production and shipment, Dr. Israel Pinheiro, president of the C.V.R.D., pointed out to the writer that the charter permits the company to participate in any enterprises that will contribute to the development of the valley. In this connection he stated that agricultural and hydroelectric undertakings eventually would be considered. The profits of the company, he said, are limited to 15 percent on invested capital (a relatively small return in Brazil) and the balance will be turned back into developmental ventures.

In addition to Dr. Pinheiro, the Brazilian directors are Major Joao Bley and General Horta Barbosa. The North Americans on the board of directors are R. K. West and R. B. Blanchard.

The engineering work associated with the installation of the ore dock, the reconstruction of the Victoria-Minas Railroad and the development of the mines is being carried out by the firm of Parsons, Brinckerhoff, Hogan and MacDonald, consulting engineers, New York. Gustav Amberg, who succeeded the late Sam Marshall, is resident manager and chief engineer with offices in Rio de Janeiro. Lawrence Waterbury of the New York office is in charge of purchasing and forwarding of equipment, some $12,000,000 worth of which has been required for the mine and railroad.

Construction operations on the railroad relocation are now being carried out by means of a contract signed jointly with the Morrison-Knudsen Co., Inc., of Boise, Idaho, and the Raymond Concrete Pile Co. of New York. These companies have formed a Brazilian corporation of which M. G. Kennedy is the vice president and general manager.

Health and sanitation activities in the Office of the Coordinator in Washington are under the direction of Col. A. R. Dreisbach, M.C., director of the division, and Maj. H. B. Gotaas, Sn.C., assistant director and chief engineer. The field director in Brazil is Maj. E. H. Christopherson, M. C.

Power Plant Requires Variety of Foundation

Oscar S. Bray
Structural Engineer, Jackson & Moreland, Boston, Mass.

Contents in Brief—*Construction of a large power generating station on low-bearing soil dictated the use of a variety of foundations. Open-end pipe piles of 18-in. dia. and 130-ft. average length were accurately driven by special methods, and filled with concrete to provide the foundation for the boiler house, turbine pedestal and turbine room. Where loads were smaller or differential settlement was of less importance other pile types were used, including cast-in-place concrete, composite, wood, and closed-end pipe piles. Some isolated structures were supported on bell caissons.*

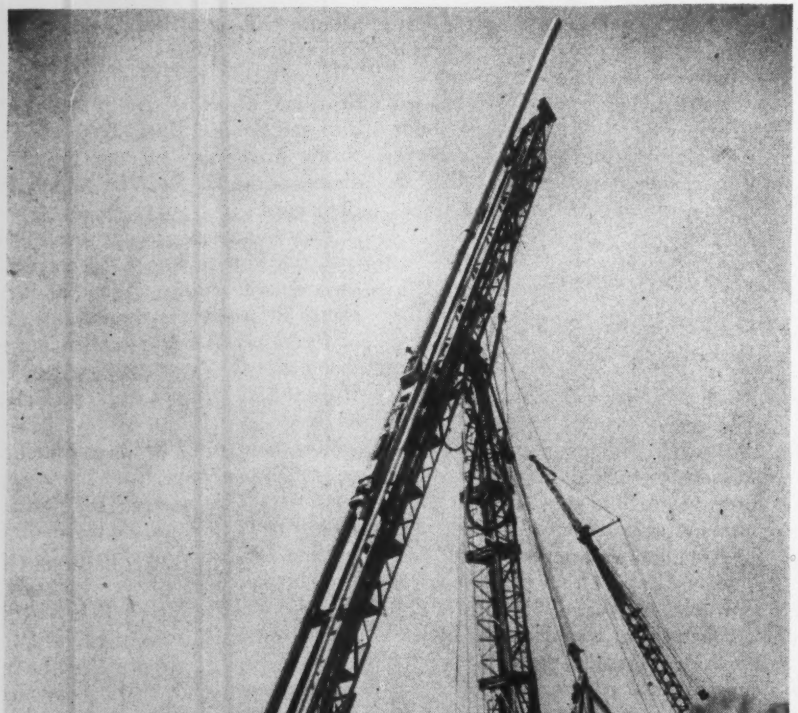


Fig. 1. Open-end, 18-in. dia. pipe piles as long as 152 ft. were driven with a full-revolving rig with leads only 110 ft. long by the expediency of sinking a 24-in. pipe about 70 ft. long into which the long pile is set.

CONSTRUCTION of the foundations fo a large steam power generating station on the Eastern Seaboard is o particular interest because of th varied types of support selected fo the several different structures. O added interest is the construction procedure followed, which included special methods developed for the jo that proved both effective and economical.

The station was constructed o filled marsh land along a tidal river The subsoil consisted of river silt sand, gravel, clays and hard-pan overlying good shale at depths ranging from 125 to 150 ft. below the surface (Fig. 2). Two well defined and persistent layers of a compact mixture o clay, sand and gravel extended over the site. The upper layer, about 10 ft thick, was encountered at roughly 3 ft. below the ground surface, and the lower, somewhat thicker, was about 50 ft. below the first. Groundwater was near the surface.

The station structures may be grouped in the following categories:

1. A combined boiler house and turbine room, the latter housing a 40,000-kw. turbo-generator unit supported on independent foundations.
2. Switch houses, and foundation slabs for the transformers and other gear.
3. Miscellaneous structures, including screen-well and circulating water system, coal handling facilities, duct lines and ash, fuel and water tanks.

The main structure is 75 by 285 ft. in plan and 135 ft. high. It houses a major portion of the plant equipment, including the boiler and the turbo-generator. The superstructure will be nearly doubled in size in the future to permit installation of a second 40,000-kw. unit; the foundations for this unit have already been placed.

Machine operating requirements necessitated that differential settlements be held within very close limits, dictating that the machinery foundations be carried to rock. The magnitude of the loads on the individual building columns, the maximum being 2,000 tons exclusive of wind loads, also called for direct bearing on rock foundation.

Pipe piles used for economy

Economy and feasibility of installation indicated the use of pipe piles. The long-length piles required had to be of high unit capacity for reasonable foundation cost and also had to possess sufficient strength to penetrate the several types of foundation material encountered above the shale. After consideration of all the factors, the engineers selected 18-in. dia. open-end steel pipe of ½-in. wall thickness as most satisfactory. When cleaned out and filled with 5,200-psi. concrete, this pile was considered to have an ultimate bearing capacity of 200 tons. A design load of 100 tons per pile was decided on, resulting in the use of 536 pipe piles varying in length from 110 to 152 ft. for the main structure, including the foundation for the future extension.

The piles were fabricated at the site from pipe delivered by rail in 45 to 55-ft. lengths. These sections were joined in the desired length by full V-butt welds, the welding being done on accurately aligned timber skids supported on timber piles. Correct initial alignment, plus careful tacking and welding, produced remarkably straight piles. No trouble from the welds was experienced in driving.

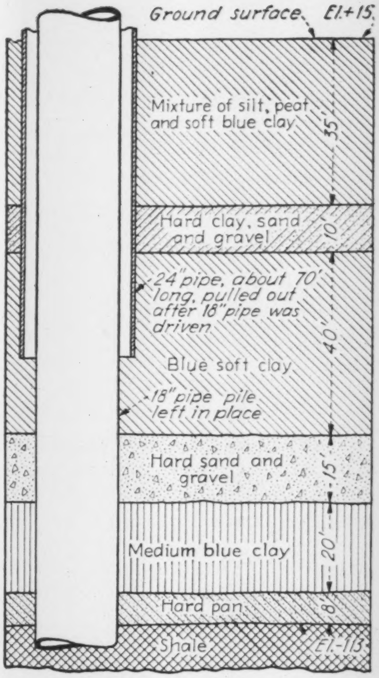

Ground surface
El.+15
Mixture of silt, peat and soft blue clay
35'
Hard clay, sand and gravel
10'
24" pipe, about 70' long, pulled out after 18" pipe was driven
Blue soft clay
40'
18" pipe pile left in place
Hard sand and gravel
15'
Medium blue clay
20'
Hard pan
8'
Shale
El.-113

Fig. 2. Although foundation conditions varied considerably, the general conditions were roughly those shown here. The 24-in. pipe used in sinking the long piles, penetrated the hard clay and sand at about El-35.

To assure development of the full capacity of the piles, it was essential that they be driven with a minimum of bow and that they be accurately positioned. Specifications required that:

(1) Maximum bow in a pile in final position should not exceed 10 in.
(2) Deviation of a vertical pile from the vertical be not more than 1 ft. in 50 ft.
(3) Deviation of batter piles from planned alignment be not more than 2 ft. in 50 ft.
(4) Deformation of any cross-section of the pile from a true circle should not reduce the cross-sectional area by more than 5 percent.
(5) Top of the pile be within 6 in. of planned position.

Special construction methods used

In addition to meeting the above specifications, the driving procedure followed had to permit driving of the full-length piles within the length of the leads of available pile drivers. To fulfill all these requirements the engineers and the pile-driving contractor developed a number of special methods, which were used with considerable success.

No pile was rejected because of deformation of the pipe cross-section, and only minor difficulty was experienced from bowing and misalignment.

A description of the methods used follows: A 24-in. dia., open-end cas-

Fig. 3. To avoid interruptions of other nearby activities when a pipe was cleaned with air and water, a shield was used to deflect the discharge to one side.

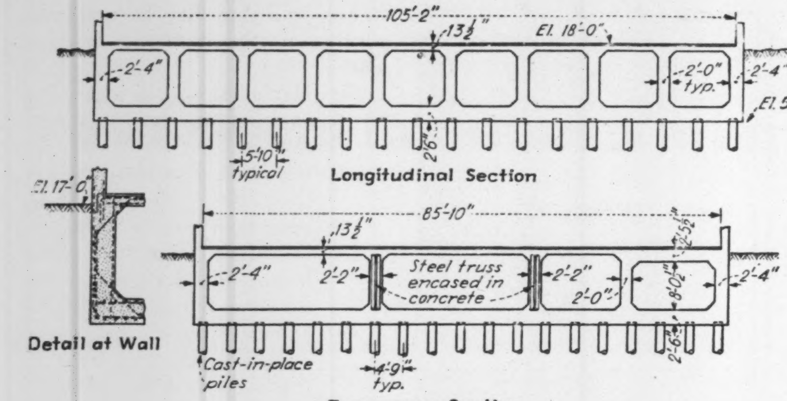


Fig. 4. The basement of the 14-kv. switch house was stiffened with two longitudinal steel strusses and several heavily reinforced transverse walls to make the basement act as a rigid box. The switch house is supported on case-in-place piles extending down to a compact layer of clay, sand and gravel.

ing about 70 ft. long was driven to full penetration with a 70-ton revolving steam rig equipped with 110-ft. leads (Fig. 1). Driving resistance was kept low by removing the earth core in the casing with compressed air and powerful water jets. Two 750-cfm. compressors and one 1,500-cfm. unit supplied the air at a 110-psi. pressure and two 6-in. electrically driven centrifugal pumps delivered the water at 125 psi. The air and water were delivered inside the casing through a 6-in. dia. pipe raised and lowered as desired by a line from the rig.

Excavation 12 cu. yd. per pile

When the 24-in. casing had been driven, cleaned out with air and water, and checked for position and alignment, the full-length 18-in. dia. pile was inserted and driven to rock. The earth inside the pile was removed periodically by the same equipment used to clean the casing. Application of the air and water jets scattered mud and debris over a wide area. This action proved a decided nuisance, particularly in cold weather. It interrupted other nearby operations, and because of the dispersion of the material and its large volume (approximately 12 cu.yd. per pile) the discharge greatly increased the problem of disposing of the material and maintenance of the working area. To correct this condition, the pipe driving contractor devised a shield attached to the top of the pile, which successfully controlled the direction of the discharge (Fig. 3).

The piles were driven to refusal or until 30 blows from a 7,500-lb., single-acting, steam hammer having a 39-in. stroke produced a penetration of not more than 3 in., this criterion being applied after the pile had been substantially cleared of earth. The pile was then completely cleaned out, inspected and cut off to grade. Following this operation, the 24-in. casing was pulled for use in driving the next pile. Pulling the casing proved to be most difficult and time-consuming. Not until a successful pulling hitch was developed, which made possible quick adjustment and resetting, were the full production potentialities of the rig realized.

Finally, the pile was filled with concrete specified to develop a minimum compressive strength of 5,200 psi. at 28 days. Although most of the piles penetrated the shale sufficiently to permit unwatering, this was not universally the case. When complete dewatering was not practicable, the pile was cleaned out, partially unwatered, inspected and the concrete placed subaqueously by means of a bottom-dump bucket of a size that could be lowered into the pile. In such cases the specified cement content in the concrete was increased by 20 percent to compensate for any losses in the water.

Footings tied together

The individual subfoundations, containing from 2 to 23 piles, were surmounted with heavily reinforced concrete caps. To insure that the entire foundation act as a unit, these footings were joined together by substantial reinforced-concrete grade beams and tied to the 11-in. thick ground floor of the building.

While sufficient operating experience with the plant on which to base a positive statement has not yet been acquired, indications to date are that the desired foundation rigidity has been attained.

While it was essential that differential settlement of the main structure be held to a minimum, this consideration, although important, did not carry such compelling weight in the case of the switch houses and other smaller units.

The test borings indicated that the thickness of the upper layer of hard material underlying the site was sufficient to carry considerable load without unduly large settlement. Since supporting the foundations on this layer offered substantial savings over supports carried to rock, the engineers decided to take advantage of its presence by transferring the structural loads from the foundation to the bearing stratum, either through bell caissons or through short piles. When further investigation revealed that ground conditions and the probable size of the caissons required made this type of construction impracticable, piles were resorted to.

Basement stiffened with steel trusses

Most interesting foundation of this type is that under the 14-kv. switch house (Fig. 4). This 85 by 105-ft. steel-frame, three-story and basement building will house the 14,000-v. switching apparatus and the station control room. The estimated total weight of the structure and its contents, 15,000 tons, was considered too great an increment to impose on the supporting stratum without inducing undesirably large settlements through compression of the underlying clay. To reduce this load increment and the concomitant anticipated settlements, it was decided to increase the amount of excavation by lowering the basement floor, removing enough existing earth load to reduce the fixed-load increment on the supporting stratum to about 6,000 tons.

Designed to provide a foundation which might tip slightly but would not flex appreciably, the basement was constructed as a strong, rigid box, stiffened by means of two concrete-encased steel distributing trusses. The trusses carried the interior columns and acted as the "backbone" of the foundation (Fig. 4). The basement was further stiffened by vertical diaphragms of reinforced concrete at right angles to the trusses nd by the main floor, which was rmly tied to the diaphragm and ormed the top of the box. The building loads were transferred from the olumns through the foundation walls r the distributing trusses to the 30-n. thick basement floor slab and hence to the piles.

The piles were cast-in-place conrete in corrugated step-taper steel hells. These piles had a uniform tip iameter of 11 in. and either 13-in. r 14-in. butts, depending on the ength. Pile lengths ranged from 19 o 25 ft., the average being about 22 t. While the pile cut-off grade in this oundation was well below permaent groundwater level, thus permiting the use of the lower priced wood iles, the greater capacity of the conrete pile permitted more economy, which was the principal factor in the election of this type. The design load was 40 tons per pile.

Limited penetration only

In order to insure full load-carrying ability, the engineers considered it essential that the piles be driven into but not through the supporting stratum. The following clause was written into the specification to cover this point: "Piles shall be driven to Grade minus 21 ft. 0 in. (2 ft. below the top of the supporting stratum) or until 30 consecutive blows from the hammer described below produce a penetration of 6 in., whichever shall first occur. Piles shall be driven with a hammer delivering not less than 15,000 ft.-lb. of energy per blow, with terminal velocity of ram not more than 15 ft. per second. A hammer having a 5,000-lb. ram with a free fall of 3 ft. 0 in. will be accepted as meeting this requirement."

This clause, modified as necessary to suit the type of pile being driven, the anticipated load and the ground conditions, was used throughout the work, with results satisfactory to both the engineers and the contractor. Standard pile driving equipment and methods proved entirely satisfactory for installation of other than the open-end pipe piles previously described, and were used throughout.

Observations of the movement of the 14-kv. building to date show settlement to be well within the allowable limits, with absolutely no signs of distress in the structure itself.

Another building of interest because of its foundations is the screen well. This heavy, reinforced-concrete facility, located on the river front, serves to admit water to the plant for condenser-cooling purposes (Fig. 5). Efficient performance of this function necessitates taking water from the cooler layers near the bottom of the river; consequently the screenwell is a deep structure and one which required considerable excavation.

Here again, the load imposed on the underlying soil by the structure was reduced in proportion to the weight of the overlying soil removed. In the case of the screenwell, the soil load removed was of such magnitude that the engineers felt justified in depending on direct earth bearing alone for support, without recourse to piles.

Screenwell supported on thick mat

Constructed inside a steel sheet-pile cofferdam, the screenwell was founded on a 5-ft. thick, reinforced-concrete mat, resting on soft clay about 32 ft. below low water. No unusual problems, other than those involved in the design of a deep, heavy cofferdam, were met. Settlement observations made on the structure during and subsequent to construction indicate that this foundation is performing about as expected, and that final settlement will be within that anticipated in design.

Foundation types for the remaining structures were selected following analysis in much the same manner as those already described. Where long piles were indicated and the cut off grade was above groundwater level, composite piles of wood and cast-in-place concrete were used. Such piles were allowed a 30-ton design load.

Where similar conditions obtained but a pile load in excess of the capacity of the wood-and-concrete composite pile was necessary, the wood section was replaced by a closed-end, 10-in. dia. steel pipe, filled with concrete after driving. These piles were allowed a load of 40 tons each.

A heavily loaded tower supporting the coal conveyor bridge was carried on 18-in. diameter steel pipe piles, driven with closed end and filled with concrete. These piles carried a design load of 75 tons each. The 15,000-ft.-lb. hammer proved to be inadequate for driving these piles, and the heavier one used on the foundation for the main structure was substituted.

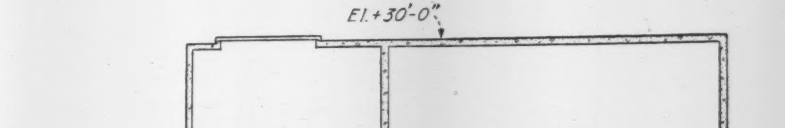


Fig. 5. Cross section through the screen well. The earth removed for this deep structure offset the weight of the structure sufficiently that it could be supported on soft clay without the use of piles.

Duct lines and manholes were supported on either 8-in. dia. tip cast-in-place concrete piles or on untreated wood piles, depending on the relation between pile cut-off and permanent groundwater level. Creosoted piles were considered for this service, but because of market conditions at that time were not used. It should be noted here that installation of an extensive system of subsurface drains on the site had lowered the groundwater level considerably, and so restricted the use of untreated wood piles in permanent installations to those locations where the cut-off grade was at or about the elevation of the bottom of the drain lines.

Some structures on belled caissons

In some isolated foundations, borings indicated that ground conditions were such as to permit successful installation of belled caissons. This type of foundation support was used wherever practicable, with some cost saving over piles. The caissons were particularly useful for scattered foundations because of the minimum amount of equipment required for their installation.

It was anticipated at the start of the work that use of a large number of different pile types might cause confusion and delay. This condition was avoided, partially through careful preparation of plans, including the liberal use of specification and other notes, and partially through flexibility of the contractor's plant and organization.

Two classes of concrete used

Concrete for the foundations was delivered by agitator truck from a commercial mixing plant. Great care was exercised in controlling proportioning, mixing, placing and curing to assure a product of uniformly high quality. As previously noted, concrete having a minimum 28-day compressive strength of 5,200 psi. was used in the piles. This mix also was specified for the screenwell. The 5,200-lb. concrete had a minimum cement conten of 728 lb. per cu.yd. and a maximu water-cement ratio of 5 gal. per sac of cement.

Foundations were ordinarily constructed with concrete having a minimum 28-day strength of 4,500 psi. This mix required a minimum of 65 lb. of cement per cu.yd. and a maximum water-cement ratio of 5.5 gal per sack. The slump was from 1 t about 4 in., depending on conditions. With the exception of piles, all concrete placement was facilitated by th use of high-speed (minimum 5,00 r.p.m.) electrically driven vibrators.

Test cylinders made from each placement showed strengths consistently above specification requirements.

The new station was constructed b the Boston Edison Co. The desig work and the engineering supervisio of construction were handled by Jackson & Moreland, Engineers, of Boston. Thomas O'Connor & Co., Boston, were the general contractors.

Big Trailer Units Carry Ore Over Nevada Highways

Heavy trailers are now making round trips of 668 miles every 24 hours carrying magnesium oxide from the mine and ore reduction plant of Basic Magnesium, Inc. at Gabbs, Nev., to its metal plant at Las Vegas, Nev., where both power from Boulder Dam and water are conveniently available. There are 22 two-trailer units in the fleet.

The nearest rail line to the mine is 32 miles away and the rail route from that possible shipping point is extremely circuitous, involving a total haul of 1,116 miles. Hence it was dedecided to reduce the ore at the mine and haul it to the plant by highway using the trailer trains shown in the accompanying photo.

One of 22 two-trailer units that haul 30 tons of ore over 334 mi. of Arizona highways. The route traversed has grades up to 7 percent.

The diesel motor and two semi-trailers empty, weigh 45,020 lb. When loaded the total gross weight is 105,020 lb. The maximum load on the highway is under the leading wheels of the trailer, which have an axle load of 18,000 lb. The maximum load on the four-wheel trucks is 27,500 lb., on two axles at 3 ft. 10½ in. spacing. Spacing center to center of trucks under each tank is 18 ft. 2 in., and the spacing between the rear trucks of the semi-trailer and the axle of the leading wheels of the trailer is 9 ft. 1½ in.

Under peacetime conditions these motor trains could make the trip from Gabbs to Las Vegas and return in 20 hours. Wartime restrictions lengthen this to 24 hours. The route traversed has grades ranging up to 7 percent; elevations above sea level range from 1,800 to 6,300 ft. Temperatures in the desert and mountain terrain range from below zero in winter to 120 deg. in summer.

On order from Basic Magnesium, Inc., the J. T. Jenkins Co. of Seattle built the tractors and the Freuhauf Trailer Co. of Los Angeles built the trailers.

Current Highway Problems Discussed at Chicago

***ontents in Brief**—Many subjects of interest to highway administrative ficers and engineers were discussed at recent meetings of the Highway esearch Board and the American Association of State Highway Officials. ighway maintenance, planning for postwar highway building and operating uestions were the major themes of the highway officials' discussion. Tech-ical matters predominated at the research meeting, attention being centered n problems growing out of war restrictions.*

AINTENANCE of our existing highays in safe operating condition until onstruction and reconstruction can e resumed after the war, preparation f plans for the great postwar contruction program that must be underaken, the place of secondary roads in uch a program, and the damage beng done to highways by overloaded rucks dominated discussions at the nnual meeting of the American Asociation of State Highway Officials eld at Chicago, Dec. 1-3. To a lesser egree, technical questions relating o postwar planning and highway aintenance came up for consideraion at the meetings of the Highway Research Board that preceded the ighway officials meeting, Nov. 27-30. At the latter meeting, progress on wide variety of highway research as reported in considerable detail. Preliminary reports of both meetings were given in the news pages of the Dec. 9 issue of *ENR*.

Little new construction

Thomas H. MacDonald, commisioner of public roads, stated that the rapidly declining construction program is indicated by the fact that only 722 miles of new federal-aid highway construction was put under way in the first ten months of 1943 as compared to 1,869 in 1942, 8,645 in 1941, and 11,843 in the first ten months of 1940. State highway maintenance activities also have been reduced, employment in 1943 being but 85 percent of that in 1942.

There is an ever increasing tempo in the demand for transportation of all kinds, said Mr. MacDonald, and because of a deterioration of both equipment and roadbed, the next few months must produce increased allocations of the requirements to serve land transportation, both rail and highway. "We are facing a period of even more intensive maintenance. Normally, 534,452 miles are thus maintained, and a recent canvas of the states of their immediate needs, aggregates estimates of 2,551 trucks and 3,768 other pieces of equipment."

Broader thinking needed

Turning to a discussion of postwar activities, Mr. MacDonald said further:

"What is actually accomplished in the highway field during the reconstruction period will be an integration of the activities of all the separate units of government. It is important that the objectives be agreed upon by those important agencies and that their initiative be protected and stimulated. There is no substitute for American initiative in the individual or in the primary groups. The state highway departments must necessarily be our reliance for carrying the responsibility of leadership. This means that the departments must engage in broader fields than they have heretofore largely occupied, and enlarge their activities to include coordination in the municipal and secondary road improvement program. The role of the federal authorities must necessarily remain to take responsibility for use of federal funds to fit the national economy.

In the future program for which we should be prepared there are two logical main divisions, said Mr. MacDonald. The first of these is to take up the lag of replacements of our seriously depreciated highway facilities by construction and by heavy maintenance. The second is to be ready to furnish employment through the contract procedures in an undetermined amount of needed highway projects as a "standby" program.

Much road work involved

"In the period from 1931 to 1942, an annual average of 148,457 man-years of labor were required directly on highway construction projects to sustain the physical volume of facilities essential to the accommodation of highway traffic on the federal-aid and state-controlled highway systems. Similarly, essential state highway maintenance occasioned an average annual employment of 133,759 man-years. Considered as an index of productivity in the postwar provision of highway facilities, a prewar direct highway labor force provides the basis for the evaluation of a normal program after the war. The job labor requirements calculated on this basis have been increased by one-third for the period after the war to permit of catching up with war-deferred construction, at the same time maintaining the normal rate. The prewar data have been expanded to include appropriate shares of municipal and local highway labor on the same basis. For all categories of highway service in the postwar period, there is indicated an average annual need for the employment of 327,155 man-years on highway construction and 460,501 man-years on highway maintenance.

Probable minimum program

"The indicated minimum program necessary to accomplish this objective will require an estimated annual expenditure for construction of $1,690,000,000 and an additional $845,000,000 for maintenance. The total expenditure of $2,535,000,000 is expected to provide employment for approximately 1,743,000 man-years of job and industrial labor. The normal post-war construction expenditure is approximately equal to anticipated highway receipts."

The standby program

"The 'standby' program ready for immediate use should be at least equivalent to that employed on WPA highway projects and PWA road and street projects at the average annual rate attained in the prewar depression period. This standby program should be non-competitive in two major respects. It should not compete for construction workmen and materials with private construction, and it should primarily produce new facilities supplementary to, rather than competitive with, other types of land transport. This standby program has been estimated to cost $1,557,000,000 annually and to provide an additional 301,254 man-years of job employment and a total of 973,050 man-years including industrial labor."

Mr. MacDonald went on to say that highways need not be competitive with railways because the principal highway movements are within 30 miles of the point of origin, hence unlimited expansion of highway facilities serving our large centers of population are possible without getting into the competitive field.

Secondary roads

With respect to secondary roads, Mr. MacDonald said that these are primarily a local problem for which it is difficult to justify the expenditure of federal funds. Such secondary and tertiary roads total something over 2½ million miles. The problem of bringing them up to adequate standards can be reduced somewhat by reducing the total mileage of public roads. He cited the case of Delta County, Colorado, where, under a land-use planning study, the total mileage of roads classified as public roads was reduced 39 percent. One older community, he said, had cut its mileage 17 percent.

Further emphasis on the need for closer integration of state, county and city highway systems was given by H. S. Fairbank, deputy commissioner of the Public Roads Administration in discussion of a rational program for postwar highway construction. If our past highway programs were irrational, said Mr. Fairbanks, it was because we considered the problem as having several parts, different people making decisions as to the state, local and city elements. Also, he noted that still other people determined the size and weight of trucks that operate over the highways. He expressed the view that the postwar highway legislation now before Congress (HR 2426) may help to bring about the desired closer cooperation between the major interests now handling highway work because that bill will carry funds for secondary roads and city streets as well as for state highways.

Preferential classifications

Mr. Fairbank recommended that the state highway departments work for the designation in each state of a preferential system of secondary roads on which federal money allocated to secondary road work could be spent. Similarly, he urged them to cooperate with city officials in determining the streets on which federal funds should be expended. Such moves toward cooperation with the city and county authorities, he added, would help to offset efforts to have separate agencies set up to handle federal funds allocated to secondary roads and city streets under HR 2426.

Still further emphasis on the need for broad planning was added by Spencer Miller, state highway commissioner of New Jersey, in a report on his recent visit to England to study postwar planning there. Highway planning in England, he said, is characterized by the same boldness that characterizes their planning for other types of public works and for housing. In London, for example, where extensive damage from air raids has made radical changes possible, a series of wide ring roads is planned connecting with a group of major radial roads, some being tunnels to carry four lanes of traffic. Planning for both road and rail transport is being closely integrated. Some short rail lines are to be abandoned in favor of road transport. New transport facilities will include extensive airports. All transport planning, Mr. Miller said, is being closely coordinated with the plans being made to reduce the concentration of population in the urban areas.

POSTWAR PLANNING SLOWED DOWN

Preparation of plans, specifications and contract drawings for postwar highway work, in most states, has been slowed by loss of men to the armed forces and to war industries, especially the younger men needed to do the drafting and routine design work. Ezra B. Whitman said that Maryland has found it necessary to put assistant engineers and inspectors into survey parties in order to get the surveys made. His department has farmed out a few of the larger bridge jobs and some of the highway planning work. One state highway engineer expressed the view that the slowness with which plans are being produced is due to the fact that the men fear they will work themselves out of jobs before the war is over and so are not pushing the work.

Hal G. Sours, Ohio director of highways, stated that Ohio has not yet been able to do much long-range planning for postwar work as the department has been concentrating on smaller projects that can be put under way quickly. He hopes to use the long-range projects as a reserve.

California is concentrating on metropolitan projects, according to G. T. McCoy, state highway engineer. The department is acquiring right-of-way for projects that can be put under construction within two years.

Montana is making fair progress on some plans for immediate work and for long-range undertakings, according to A. F. Winkler. Purchase of the necessary right-of-way has been authorized and will be made as soon as the PRA approves the projects that have been submitted to it.

C. H. Sells, superintendent of public works, New York, said that New York state is using its own funds to prepare its postwar plans and has not applied to the PRA for funds. This, he believes, is one reason why the states made such a poor showing in the records of the Public Roads Administration that were examined by Representative Robinson when preparing his talk to the association (*ENR*, Dec. 9, p. 862). Mr. Sells urged the states to get the amount of their work on record before the House Committee on Roads begins its hearings.

Mr. Sells sees a possibility that the highway industry may be unable to meet its full responsibilities in the period immediately following the war due to lack of materials and equipment. He stated that designs are being prepared just as though all the needed material would be immediately available after the war although the supplies of some materials are completely exhausted. He stated further that it will not be possible to let contracts for very large amounts of work immediately following the war because the contractors will be unable to get the equipment and materials needed to carry on the projects.

Contractors must bid high

On the matter of costs, Mr. Sells said that estimates are being based on current prices, yet there is good reason to believe that the labor and material price situation will be so uncertain immediately following the war that contractors will have to bid high to protect themselves. This, he stated, might result in bids so high that the state highway departments would not dare to let contracts so far above their estimates of cost.

Like views were expressed by Ezra Whitman, while C. D. Curtiss of the Public Roads Administration expressed the view that there may be a period between the European phase of the war and the end of the war with Japan that will permit a gradual start on the postwar road building program.

G. T. McCoy expressed confidence in the ability of contractors in California to take up any program that could be put under way by the highway department. As to a shortage of materials, Mr. McCoy feels confident that by the time the war ends there will be sufficient steel for the highway projects, that there will be ample asphalt and that sand and stone released by the termination of war construction will be ample. He thinks, however, that Mr. Sells' view concerning the possible shortage of equipment is correct.

M. J. Hoffmann, Minnesota commissioner of highways, endorsed Mr. Sells' views as to the need for getting the total amount of work that is being planned on record in Washington. Minnesota has a two-year program substantially complete.

Road work after the war

In a symposium on road construction during the immediate postwar era, reports were made from several sections of the country on construction equipment, construction methods and materials, unit prices and output, engineer-contractor relations and contractural procedure.

Manufacturers of highway construction equipment have the capacity to produce ample equipment to cope with postwar construction, asserted J. J. Corbett, engineer of construction, Missouri State Highway Department. No revolutionary change is expected in this equipment immediately following the war since the industry as a whole has been concentrating on increasing production with little time available for new development. However, said Mr. Corbett, some improvements in equipment design seem inevitable. We can expect increased mobility of heavy equipment due to war experience with crawler and combination crawler-wheel types of traction; also reduction of equipment weights without strength impairment, and increased motor efficiencies.

Much pavement rebuilding

Reconstructing and rebuilding highway surfaces broken and inadequately maintained during the war period will be of first order importance, according to a report by R. M. Gillis, construction engineer, California Division of Highways. Many two-lane main trunk highways, some of which were inadequate even before the war, will require the construction of two new heavy duty traffic lanes to give a four-lane divided highway.

That more emphasis will be placed on the durability of concrete in the postwar period, on prevention of surface scaling and the elimination of the structural failure of concrete pavement was stated in a report by A. W. Bushell, chief engineer, Connecticut State Highway Department. Expansion joints will be improved by the addition of synthetic resins to the asphalt. Other postwar developments in the highway field will be the use of new alloy steels in snow plow and honing blades to increase their durability, and directional and warning signs made of pressed wood or plywood and waterproofed with resins or plastics to give the necessary protection with far less maintenance.

Engineer-contractor relations in the postwar construction era were viewed somewhat dubiously by J. Douglas, construction engineer, Texas Highway Department. With speed being the keynote of our wartime construction, said Mr. Douglas, many war contracts were awarded under the negotiation system. The Army's assignment was rapid progress and quick completion. Its officers were the drivers, with civilian help being used for the actual detailed supervision. Consequently when a civilian or minor officer required strict conformity to specifications, contractors occasionally complained to district or division officers of the Army that progress was being delayed by such requirements. In some instances the officer, seeing that work was behind schedule, overruled the civilian in favor of the contractor. The result was the loss of authority for engineering supervision in the field which he fears may carry over into postwar work. Mr. Douglas asserted that this statement was not intended to be adverse criticism of construction procedure during wartime when speed of construction was of paramount importance.

Mr. Douglas' report was presented to the meeting by D. C. Greer, Texas State Highway engineer.

That postwar construction should continue to be contracted for on an item price contract method after the war was the consensus of the group of construction engineers. It is generally believed that unit prices will continue at a high level, with a gradual reduction as the efficiency and output of construction equipment is increased after the war.

"Projective maintenance"

Maintenance is the principal phase of current highway operation and the direction it takes today will determine the kind of roads there will be tomorrow, according to H. D. Metcalf, chief engineer of the bureau of maintenance, Ohio Department of Highways. With wartime traffic causing severe damage to many of our highways throughout this country, they will require maintenance beyond the normal if disaster to them is to be prevented and our highway investment protected.

This threatened breakdown of our highways will require a different approach to maintenance problems than has been used in the past. Past practice has leaned towards the sustaining type of maintenance; today we should adopt vigorous, forward-looking methods which Mr. Metcalf termed "projective maintenance." It is analogous to stage construction in that efforts are made not merely to sustain the road in its existing condition but to adapt the maintenance to fit into the future development of the road. This type of maintenance, said Mr. Metcalf will eliminate much of the necessity for new construction after the war.

Base strengthening is one of the best forms of protective maintenance. The higher types of pavement may be strengthened by piece-meal replacements of the weaker or broken-up portions of the base in conjunction with supplementary drainage. Pumping joints may be tightened up by mud jacking, asphalt subsealing or by under-slab drainage. Macadam bases can be strengthened in the weaker portions by reconstruction to a greater thickness, combined with corrective drainage or subgrade improvement. Such a program, asserted Metcalf, if properly planned and executed will provide an admirable base for higher type pavements; but the roads under consideration must have grade and alignment fitting in with future plans if much of the work done is not to be wasted.

Secondary roads

Active discussion of secondary roads developed in the meeting of the A.A.S.H.O. committee on administration where question was raised as to the type of secondary road construction that would be required by the Public Roads Administration.

The view was expressed that in some parts of the country roads classed as secondary roads are now being built at a cost of from $30,000 to $40,000 a mile because of high standards called for by the PRA. If attempts should be made to apply such high standards on a national basis a vast mileage of secondary roads would be overbuilt. Hal G. Sours and Ezra Whitman said that there is need for wide flexibility in what is defined as a secondary road. A standard that would meet the needs of some of the North Atlantic States where there is more traffic on secondary roads than there is on some primary roads in the West, would be an absurd requirement for the sparsely settled areas out on the plains where a satisfactory road for light traffic can be built at little cost. Mr. Sours urged that the PRA make no major changes in the standards to which secondary roads are now being built as this would result in a large amount of new design work.

J. U. Shroyer of Pennsylvania opposed the allocation of large amounts of money to secondary road work, expressing the belief that it would result in the construction or reconstruction of many miles of roads that could not be justified by traffic requirements. He recommended that the A.A.S.H.O. approach Congress in the matter of allowing the states considerable flexibility in the amount of money allocated to secondary roads.

W. W. Mack said that Delaware would have difficulty in finding places to spend much money on secondary roads.

C. D. Curtiss of the Public Roads Administration supported the view that standards for secondary roads should fit regional needs. He said he was unaware of any requirement on the part of the PRA that the roads be built to standards approaching those of primary roads.

Both M. J. Hoffmann of Minnesota and William J. Cox of Connecticut expressed the view that the PRA would not be so unreasonable as to set up requirements all out of line with the actual needs of any region.

DAMAGE DONE BY OVERLOADED TRUCKS

Active discussion of the extent to which highways are being damaged by overloaded trucks was aroused by a paper by Charles D. Vail, state highway engineer of Colorado, outlining the unsuccessful attempts he has made to keep truck operators from consistently exceeding the load limits set by the emergency agreement of 1942 concerning the operation of trucks serving war industries. Colorado only had to make minor liberalization of its regulations as it already had an axle load limit of 18,000 lb. However, many trucks are loaded far in excess of this amount and the department was unsuccessful in getting the Office of Defense Transport to support its efforts to compel truck operators to adhere to the 18,000 lb. load limit.

May seek higher limits

Mr. Vail expressed the fear that if truck operators are permitted to operate on regular schedules with loads in excess of the limit set by the A.A.S.H.O. they will insist on being permitted to carry similar loads after the war, thus making necessary a complete change in load limits. This would make most highway structures obsolete overnight.

Like views were expressed by T. H. Cutler, state highway engineer of Kentucky. Oil trucks that can carry loads in excess of the legal limits are now being operated. Mr. Cutler also called attention to a possible decline in revenues due to increasing use of diesel-powered trucks. As the tax for fuel oil used on the highways is not collected through the distributor, as is the case with gasoline, the state has to depend upon the truck operators to report fuel so used. Similar conditions exist in Montana where many diesel operators pay no tax, according to A. F. Winkler.

Ezra B. Whitman, chairman of the Maryland Commission, said that overloaded trucks are doing heavy damage to roads in that state. He is positive that the breaking up of comparatively new highways is due to this overloading. The trucking organizations in Maryland are so powerful that they succeeded in getting a 22,000-lb. axle load limit approved by the legislature. He hopes that it will be possible to have this cut back to 18,000 lb. after the war.

Damage to highways in Delaware also is serious, according to W. W. Mack, chief engineer. Mr. Mack thinks that the A.A.S.H.O. should make advances to the truck manufacturers to redesign their trucks to get a proper distribution of the load over the axle. Little load is now carried on the forward axle. Better designs would make it possible to carry larger loads without an increase in the wheel concentrations.

J. U. Shroyer, secretary of highways for Pennsylvania, stated that Pennsylvania has spent $1,000,000 in repairing roads this year that were damaged by overloaded trucks. He said that the highway operating departments are being ridden over roughshod by the truck operators because of their political influence.

Operating speeds

Some aspects of a recent series of studies on driver behavior and vehicle performance sponsored by the Public Roads Administration and conducted in cooperation with several highway departments were reported y O. K. Norman, senior highway en-ineer, PRA. These studies show that n alignment which permits high peed operation when traffic is light ill not necessarily give more satisactory operating speeds when the olume of traffic is high than will an lignment on which cars must travel t somewhat slower speeds. The reort also stated that two-lane highays designed for 70 m.p.h. generally ill not permit speeds above 60 m.p.h. xcept at extremely low traffic density.

Recommendations of the report reating to the design of high-speed oads were that access to such highays should be both limited and conrolled and that grades at important ntersections should be separated. Freuent intersections of grades or freuent access points along a high-speed ighway will result in an unduly high roportion of slow speed vehicles, aid Mr. Norman. He expressed the pinion that greater overall benefits ill be derived by the traveling public f more consideration is given to inreasing the average speed by reducng the number of slow moving cars nstead of designing highways to acommodate cars traveling at very high peeds.

Studies to determine the transverse lacement of vehicles as related to avement width were reported by A. Taragin, assistant highway engineer of the Public Roads Administration. A total of 17,000 vehicles moving over pavements of widths of 18, 20 and 24 ft. with grass shoulders was studied. It was found that the distance from the center of the pavement that free-moving passenger cars travel did not change until a 24-ft. pavement became available; on the other hand, drivers of commercial vehicles steadily increased their distance from the center as pavement width increased.

Trends in traffic volume

Current trends in the volume and characteristics of highway traffic were reported by John T. Lynch, senior highway economist, PRA. The general trend in volume has been downward throughout 1942 and 1943 in all sections of the country, but to a greater degree in the East than elsewhere.

The indicated decrease in total vehicle mileage on main rural roads from 1940 to 1943, is about 45 percent in the East, 34 percent in the Midwest and 31 percent in the West. Corresponding decreases in truck mileages over the same period of time and in the same localities are 24, 20, and 9 percent respectively. One point of interest in this survey, asserted Mr. Lynch, is that traffic by truck combinations has increased in all regions of the country since 1940. Average weight increases have nearly offset decreases in vehicle mileages, so that the total ton mileage of truck loadings in this country during 1943 is expected to be only about 5 percent less than that in 1940.

Despite the order by the Office of Defense Transportation limiting speeds to 35 m.p.h., average speeds have never been below this permissible maximum.

Freeway design studies

Methods being applied to the design of freeways for postwar construction were described by Fred J. Grumm, engineer of surveys and plans, California Division of Highways, and M. A. Kaehrle, of the Connecticut Highway Department. Mr. Grumm centered his talk on the relation of right-of-way widths to design of freeways in metropolitan areas. Right-of-way widths through highly developed areas, he said, must be based on design needs, not on an arbitrarily selected width. The number and width of lanes is not subject to much adjustment to meet right-of-way restrictions, but shoulders can be reduced in width and in some places outer highways to serve abutting property can be eliminated.

Access rights are not purchased along limited-access highways in California where outer highways are used to serve the adjoining property. Consequently, in the design studies the cost of acquiring these access rights must be weighed against the cost of building a parallel service road.

Mr. Kaehrle centered his discussion on studies made in Connecticut to determine whether limited access roads should be carried through built up communities or whether they should be carried around the communities. In these studies, the service rendered by the facility in reducing traffic congestion is weighed against the greater cost of building through the more highly developed territory.

Further information on these studies in the Ansonia-Derby-Shelton area was given at the Highway Research Board meeting by Roy E. Jorgensen, director of the Connecticut studies.

Origin and destination surveys or "interviews" were made of the traffic entering and leaving the area. Time and delay studies also were made on three alternate routes by driving over them by car to measure the running time and to determine the number of stops required. Time-savings values, based on an hourly rate, were assigned to passenger cars, light trucks and heavy trucks or semi-trailers to establish the economic worth of the three routes.

The total annual estimated economic savings for the three routes under study ranged from $42,500 to a maximum of $131,400. Other benefits of less importance which Mr. Jorgensen said should be considered in such a survey include the elimination of traffic stops, gradient and alignment savings, and roadway surface savings.

Economic theory questioned

R. L. Morrison, professor of highway engineering at the University of Michigan, at the meeting of the highway transportation economics department, questioned the commonly accepted theory that new highway projects should be justified on the basis of earnings resulting from increased use of the highway. The only real justification for a highway, said Prof. Morrison, is the service justification. Followed to its logical conclusion, the earnings theory would make it desirable to add to the mileage that a car must travel to reach its destination rather than reduce the mileage.

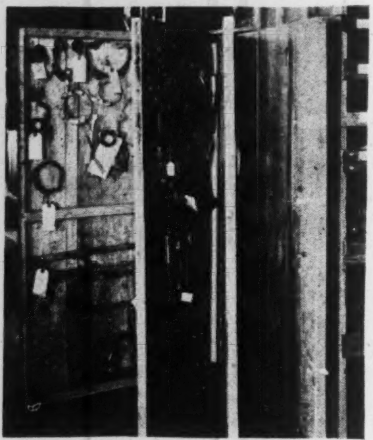
Professor Morrison also cautioned against capitalizing the savings resulting from elimination of small delays. Only delays of considerable length can be capitalized under a sound economic analysis.

In discussion, R. A. Moyer, Iowa State College, said that it is possible to show a saving of a cent a mile in improving the surface of a gravel road, yet there is no tax by which a state highway department can get back the cost of the improvement from the taxpayer. Nevertheless, he thinks that such savings to the user are important factors to be evaluated in studying highway improvements.

(*Summaries of papers and reports relating to pavement design, base stabilization with cement and salts, and bridge design presented at the Highway Research Board meetings will be published in a subsequent issue.*)

From Field and Office

WORKING PROBLEMS AND TIME-SAVING METHODS FOR ENGINEERS AND CONTRACTORS



G. Haven Bishop Photo

COMPACT CHEST FOR PARTS

To save space Ralph E. Mills Co. engineers in building a large shop at Cartago, Costa Rica, to repair equipment used on the Inter-American Highway built spare parts chests of the type above. They are about 5 ft. high and built of wood to save critical materials. The chests are supported at the ends of the storage bins, which permitted excellent light and convenient storage in a small space of many parts of the same general kind.

Timber Footbridge Designed For Center Load of 1,000 lb.

When war made steel a critical material, timber was substituted by the Imperial Irrigation District for hydrographers' bridges across the main canals. The accompanying drawing gives dimensions and details of a bridge built for a canal which has a 58-ft. width of water surface.

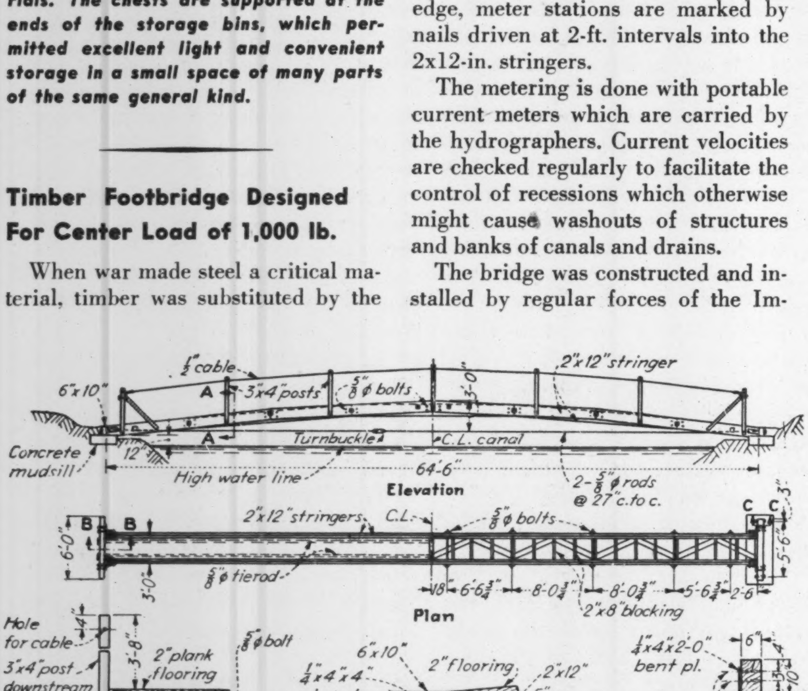
It was not possible to entirely avoid the use of steel, but the two ⅝-in. tie-rods were salvaged from scrap, as were also the through bolts, plate washers and bent plates.

With stock sizes of timber, and considering the stringers as curved beams with no restraint, it was possible to develop a design that permits a load of 1,000 lb. at the center of the span. This loading was considered ample since the bridge is intended only for metering crews of not more than two men. Wind load was provided for by fixing the ends of the span to concrete mud sills. No stay cables were put in.

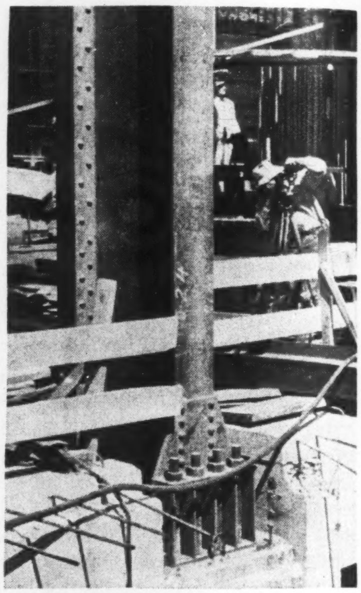
In lieu of a handrail, a steel cable was threaded through holes near the tops of posts along the downstream side of the bridge. Along the upstream edge, meter stations are marked by nails driven at 2-ft. intervals into the 2x12-in. stringers.

The metering is done with portable current meters which are carried by the hydrographers. Current velocities are checked regularly to facilitate the control of recessions which otherwise might cause washouts of structures and banks of canals and drains.

The bridge was constructed and installed by regular forces of the Imperial Irrigation District, of which M. J. Dowd is chief engineer and general superintendent and D. D. Vinzant is construction superintendent.


½" cable
6"x10"
A
3"x4" posts
⅝" ϕ bolts
3'-0"
2"x12" stringer
Concrete mudsill
12"
A
Turnbuckle
C.L. canal
64'-6"
High water line
Elevation
2-⅝" ϕ rods @ 27" c. to c.
B
B
6'-0"
2"x12" stringers
C.L.
⅝" ϕ bolts
C
C
3"
5'-6"
⅝" ϕ tierod
3'-0"
18"
6'-6¾"
8'-0¾"
8'-0¾"
5'-6¾"
2'-6"
2"x8" blocking
Plan
Hole for cable
4"
3'-8"
3"x4" post - downstream side only
⅝" ϕ bolts
2" plank flooring
⅝" ϕ bolt
2"x12"
1"x6" X-brace
2"x8" blocking @ 24" c. to c.
Section A-A
6"x10"
¼"x4"x4" pl. washer
2" flooring
2"x12"
⅝" ϕ tierod
Concrete mudsill
2"x8" blocking
Section B-B
¼"x4"x2'-0" bent pl.
6"
⅝" ϕ bolts
Concrete mudsill
Section C-C

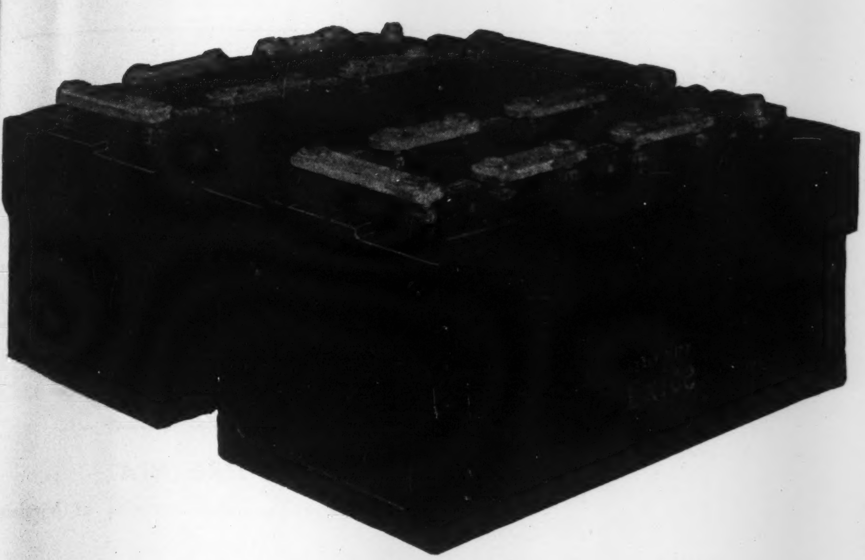
Hydrographers' footbridge used for gaging stream flow in a California canal.



Depressed Steel Column Base To Carry Two 100-Ton Cranes

Steel columns for Pit River No. 5 powerhouse, being built by the Pacific Gas and Electric Co., are made heavy enough to carry two 100-ton cranes that combine for the heavier lifts. A built-up column is used, consisting of a 28-in. rolled I-beam whose flange on the interior side is strengthened by a 16-in. I-beam with its web bolted to the flange of the larger beam. This compound column, which is shown in an accompanying picture, has a footing designed so that anchor bolts will not project above floor level.

The foundation plate on which the column was to rest was grouted in, about 16 in. below finished floor level. When the concrete floor was poured, sufficient space was left around the column for bolting it in place. After completion of the steel superstructure, concrete was poured around the base of the column up to finished floor level.



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FORM 3764

CONTRACT UNIT PRICES

What contractors are bidding on different kinds of construction work

SANITARY SEWER, UTAH

OWNER: Town of Clearfield, Utah; G. H. Holt, president of Town Board; Caldwell & Richards, Salt Lake City, engineers.

PROJECT: Construction of sanitary sewer system in Clearfield, Utah, including the furnishing and laying of 50,300 linear feet of vitrified clay sewer pipe ranging from 6 to 12-in. in diameter; excavation and backfill for main trench and for house connections; manholes, flush tanks, and lamp holes; enclosing cast iron pipe in 20-in. steel casing for passage under railroad tracks; and necessary paving. Alternates were allowed for clay or concrete sewer pipe. Contract awarded on basis of clay pipe.

CONDITIONS: Contractor to furnish all materials and complete work in 150 days. Rail and highway transportation facilities available. Wage rates are: skilled labor, $1.25 to $1.50 per hour; semi-skilled, $1.12½; and common, 75c.

BIDS: Bids were originally asked September 7, 1943, but opening was postponed to Oct. 28, 1943. Four bids were received on this date, ranging from the contract low of $144,179 to $175,041. Estimated construction cost, $161,201.

LIST OF BIDDERS:

1. Peter Kiewit Sons Co. and Big Horn Constr. Co., Denver, Colo. (contract)	$144,179
2. Roarks & Co., Ogden, Utah	159,833
3. Stroud-Seabrook, Bakersfield, Calif	169,315
4. C. O. & W. J. Brand, Riverside, Calif	175,041

Schedule I—Excavation and Backfill

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Excav. and backfill, main trench	28,500 c. y.	$1.20	$2.02	$2.30
2. Excav. and backfill, house conn	10,000 c. y.	1.37	1.72	3.00

Schedule II—Clay Pipe and Fittings

Item	Quan.	Unit Prices (1)	(2)	(3)
1. 12-in. clay pipe and fittings	2,300 l. f.	$1.50	$1.20	$1.00
2. 10-in. clay pipe and fittings	4,500 l. f.	1.20	1.06	.90
3. 8-in. clay pipe and fittings	18,500 l. f.	.95	.92	.70
4. 6-in. clay pipe and fittings	25,000 l. f.	.75	.80	.50
5. 4-in. clay pipe and fittings (service connections)	20,000 l. f.	.75	.63	.30
6. 12x4-in. clay pipe wyes	12 ea.	6.00	3.41	5.00
7. 10x4-in. clay pipe wyes	19 ea.	4.80	2.64	4.50
8. 8x4-in. clay pipe wyes	142 ea.	3.65	2.62	3.00
9. 6x4-in. clay pipe wyes	567 ea.	2.65	1.67	2.00

Schedule III—Concrete Pipe and Fittings (Alternate items allowed)

Item	Quan.	Unit Prices (1)	(2)	(3)
1. 12-in. conc. pipe and fittings	2,300 l. f.	$1.50	$1.22	$1.00
2. 10-in. conc. pipe and fittings	4,500 l. f.	1.25	1.08	.90
3. 8-in. conc. pipe and fittings	18,500 l. f	1.00	.94	.70
4. 6-in. conc. pipe and fittings	25,000 l. f.	.80	.82	.50
5. 4-in. conc. pipe and fittings (service connections)	20,000 l. f.	.75	.65	.30
6. 12x4-in. conc. pipe wyes	12 ea.	6.00	3.61	5.00
7. 10x4-in. conc. pipe wyes	19 ea.	5.00	2.84	4.50
8. 8x4-in. conc. pipe wyes	142 ea.	4.50	2.82	3.00
9. 6x4-in. conc. pipe wyes	567 l. f.	4.00	1.77	2.00

Schedule IV—Manholes, Flush Tanks, Lamp Holes

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Manholes, 4 to 6-ft. deep	14 ea.	$92.00	$94.00	$100.00
2. Manholes, 6 to 8-ft. deep	73 ea.	110.00	107.00	120.00
3. Manholes, 8 to 10-ft. deep	32 ea.	132.00	118.00	140.00
4. Manholes, 10 to 12-ft. deep	9 ea.	167.00	127.00	160.00
5. Flush tanks, 4 to 6-ft. deep	1 ea.	138.00	132.00	160.00
6. Flush tanks, 6 to 8-ft. deep	1 ea.	167.00	145.00	180.00
7. Flush tanks, 8 to 10-ft. deep	1 ea.	196.00	156.00	200.00
8. Lamp holes, 8-in. line type B	1 ea.	12.00	22.00	30.00
9. Lamp holes, 6-in. line type B	17 ea.	16.00	19.50	27.00

Schedule V—Miscellaneous

Item	Quan.	Unit Prices (1)	(2)	(3)
1. 10-in. c. i. pipe in 20-in. steel casing under U. P. tracks	90 l. f.	$16.00	$14.00	$20.00
2. 6-in. c. i. pipe in 20-in. steel casing under U. P. tracks	75 l. f.	15.00	14.00	19.00
3. Furn. and place fill mat'ls. under pipe	1,000 c. y.	7.00	2.50	6.00
4. Furn., place lumber under pipe	5 Mbm.	100.00	70.00	150.00
5. Furn., place lumber as sheeting in place	5 Mbm.	100.00	90.00	125.00
6. Furn., place road gravel base	1,000 c. y.	3.30	2.00	3.00
7. Furn., place bitum. road surface	1,800 s. y.	1.50	1.60	1.00
8. Furn., place conc. road slab	30 c. y.	23.00	26.00	25.00
9. Furn., field office complete	Lump Sum	460.00	400.00	1,000.00

HIGHWAY, VIRGINIA

OWNER: Dept. of Highways, Commonwealth of Virginia, Richmond.

PROJECT: Construction of 3.81 miles of plain concrete pavement in Princess Anne County, from a point 2.52 miles west of Lynnhaven Inlet to 2 miles east of eastern city line of Norfolk, Va. Pavement is 9-in. uniform. Project to include all necessary excavation, concrete structures, pipe, retaining walls, piling, curb and gutters, drainage structures, and seeding, sodding and topsoiling.

CONDITIONS: Contractor to furnish all materials and complete project in 180 calendar days. Rail, highway and water transportation facilities available. Prevailing wages to be paid.

BIDS: Eight bids were received November 4, 1943, ranging from the contract low of $232,014 to $326,947.

LIST OF BIDDERS:

1. W. H. Scott, Inc., Franklin, Va. (contract)	$232,014
2. Y. L. Brown, Richmond, Va	243,661
3. T. E. Ritter Co., Norfolk, Va	258,988
4. Norfolk Paving Co., Norfolk, Va	261,512
5. B. W. Jackson Contracting Co., Richmond, Va	271,772
6. Bero Engr. & Constr. Corp., Langley Field, Va	273,488
7. Highway Contractors, Inc., Norfolk, Va	286,216
8. Phil H. McGuire, Norfolk, Va	326,947

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing and grubbing	7 ac.	$300.00	$200.00	$300.00
2. Regular excavation	13,200 c. y.	.50	.56	.70
3. Borrow excavation	76,578 c. y.	.68	.68	.80
4. Class A concrete	27 c. y.	45.00	50.00	35.00
5. Class B concrete	36 c. y.	40.00	40.00	35.00
6. Metal reinforcement	2,031 lb.	.10	.07	.06
7. 15-in. pipe	1,284 l. f.	1.50	2.40	1.75
8. 18-in. pipe	411 l. f.	2.20	2.40	2.25
9. 24-in. pipe	9 l. f.	4.00	2.40	3.50
10. Pipe to be relaid	81 l. f.	2.50	2.40	1.50
11. Class C. concrete	8 c. y.	40.00	40.00	40.00
12. Conc. retaining walls (Cl. C)	152 c. y.	30.00	30.00	30.00
13. Grouted rubble gutter	14 s. y.	3.00	15.00	4.00
14. Piling untreated	2,640 l. f.	1.00	1.30	1.25
15. Wakefield piling (treated)	9 Mbm	300.00	400.00	275.00
16. Project markers	2 ea.	3.00	5.00	5.00
17. Reset project markers	6 ea.	2.50	4.00	2.50
18. Plain comb. cement conc. curb and gutter	6,741 l. f.	1.50	1.40	1.70
19. Radial comb. cem. curb and gutter	196 l. f.	1.50	1.75	2.50
20. HES cem. conc. (str. appr. & entr.)	554 s. y.	3.00	2.98	3.44
21. Curb. drop inlets complete	3 ea.	100.00	75.00	150.00
22. Spec. curb. drop inlets, complete	7 ea.	100.00	80.00	125.00
23. Curb catch basins	5 ea.	120.00	70.00	150.00
24. Spec. curb. catch basins	4 ea.	120.00	75.00	100.00
25. 4-in. concrete sidewalk	5,406 s. y.	1.80	2.00	1.60
26. 6-in. cement conc. median strip	33 s. y.	2.50	2.50	2.00
27. 4-in. cement conc. median strip	1,901 s. y.	1.80	1.70	1.60
28. Cement concrete lip curb	4,206 l. f.	1.10	.80	.60
29. Reset conc. rt.-of-way monuments	5 ea.	2.00	4.00	1.25
30. Remove steel fence	500 l. f.	.25	.12	.25
31. Cast iron grate with collar ((Std.)	1 ea.	30.00	30.00	50.00
32. Remove concrete pavement	2,6[illegible] s. y.	1.00	.75	.50
33. Selected local material	210 c. y.	5.00	4.60	3.00
34. Topsoil	4,850 c. y.	2.75	1.60	1.75
35. Seeding	76,090 s. y.	.08	.065	.08
36. Move and reset trees	29 ea.	10.00	10.00	4.00
37. Broadcast sodding	18,200 s. y.	.23	.11	.225
38. 9-in. plan cem. conc. pavement	14,052 s. y.	2.54	3.00	3.37
39. 9-in. plain cem. conc. pavement, monolithic lip curb	22,745 s. y.	2.54	3.12	3.04
40. 9-in. HES cem. conc. pavement	581 s. y.	3.00	3.18	3.34

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LONE STAR CEMENT, WITH ITS SUBSIDIARIES, IS ONE OF THE WORLD'S LARGEST CEMENT PRODUCERS: 15 MODERN MILLS, 25-MILLION BARRELS ANNUAL CAPACITY

BATES-GRATES

FOR YOUR OPEN STEEL FLOORING AND YOUR FLOORS, TOO, WILL BE CLEANER AND SAFER

See that scraper tread—and the crisp lines of the Hex cross bar? *That* gives a safer and cleaner tread and at the bottom of those cross bars you find clean, well-shaped fillets made by the metal displaced in the Bates patented process—no metal is lost. The weld is cleaner and stronger. The *floor* is cleaner and stronger. Yet, open steel flooring made under Bates patents costs no more.

Write for copy of well-illustrated, 8½" x 11" CATALOG NO. 43-44. It gives complete data on fillet welded Open Steel Flooring and Stair Treads.

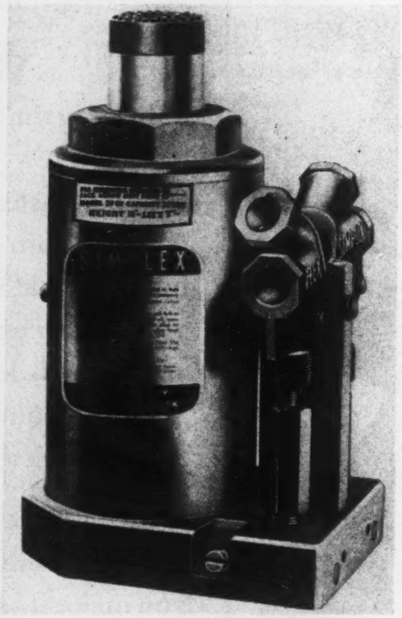
BATES GRATES

WALTER BATES COMPANY, INC.
JOLIET • ILLINOIS
OPEN STEEL FLOORING • STAIR TREADS

NEW AIDS TO THE CONSTRUCTOR

Hydraulic Jacks

Developed to move heavy weights faster, two new tandem-pump Simplex 30-ton and 50-ton hydraulic jacks have been announced. These jacks have high and low speed pumps, which may be operated singly or in unison, and are said to be sturdy, dependable and easy to operate.



The base of these jacks is solid steel bar stock. The jacks have two release valves located on opposite sides of the base. Either release screw controls ram return. An easy carrying grip is an integral part of the high-speed pump.—*Templeton, Kenly & Co., 1020 South Central Ave., Chicago, Ill.*

• • •

Temperature Anticipator

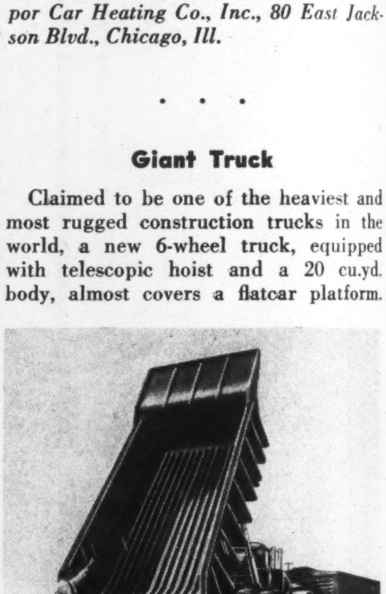
A reliable, simple warning system has been devised to immediately warn when temperature starts to rise, and to demand attention when the danger point is reached. This device, available for temperatures ranging from −60 deg. F. to +500 deg. F., may be used in oil, Prestone, and other liquids and gases, and, it is claimed, will maintain its original accuracy for life.

Of rugged construction, this temperature warning system is very flexible and economical in its use of electric current. A brilliant red signal flashes at intervals when temperature rises above normal rate; the flashes speed up if the temperature continues to rise, and the red signal stays lighted when the danger point is reached. When temperature is normal, a dull green signal shows.—*Vapor Car Heating Co., Inc., 80 East Jackson Blvd., Chicago, Ill.*

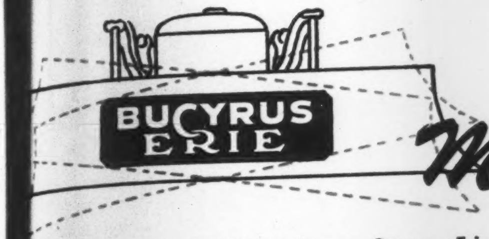
• • •

Giant Truck

Claimed to be one of the heaviest and most rugged construction trucks in the world, a new 6-wheel truck, equipped with telescopic hoist and a 20 cu.yd. body, almost covers a flatcar platform.



The hoist (Model T-4440) and the body are mounted on a Mack Model FCSW 6-wheel, 170-in. wheelbase chassis. The body is constructed from ¼-in. plate, reinforced at the bottom with ¼-in. wearing plate and 2-in. oak filler.—*Gar Wood Industries, Inc., Detroit, Mich.*



Make the TILT Work for YOU

nan can tilt or angle the blade on a Bucyrus-Erie ader in just a few minutes time without assist- That's why it's so easy to take advantage arly of blade tilt to do your work in the fastest nost efficient way possible. Here's how you can he tilt:

WHEN TRACKS MUST TRAVEL ON A SLOPE AND YOU WANT TO ESTABLISH A LEVEL CUT: Tilt in with the advance corner low, which starts a leveling cut and throws the material out along the angled blade, overcasting the excavated material. As tracks move onto the section you have notched into the bank and filled on the slope, continue with the tilted blade only long enough to get tracks on the desired grade level. Then adjust back to a level blade but continue to lead with the inside corner in order to plow the material out to fill on the side slope.

1

WHEN TRACKS MUST TRAVEL ON THE LEVEL AND YOU WANT TO ESTABLISH A SLOPING CUT: With front corner tilted down, take a cut along the centerline of your ditch until you have a track length. Then level the blade and, working your tractor on the slanted bank, continue to angle your material up the slope and into your spoil pile. If you are opening a V-ditch, repeat on the opposite side at proper slope to make the desired cut.

2

PEELING (OR SLOPING DOWN) VERTICAL OR STEEP BANK: Tilting the forward corner of the blade up and raising it high, use the end to "peel" or shave off the material. Continue the operation until you bring the bank to the desired slope, or until you have a slope on which the tractor can operate.

3

out about the complete line of Bucyrus-Erie tor equipment from your nearest International TracTor distributor. There are blades, scrapers, ers, rollers, and grubbers that will give you speed economy.

In all blade work, reduce backing up moves whenever you can. Plan al possible work to dig both ways not only to apply more of your tim to moving dirt, but also because excessive back-up makes for excessiv tractor maintenance.

N-5

BIG JOBS AHEAD
for YOU...
with JACKSON VIBRATORY HAND SCREED!

But before you tackle the big Post-War concrete contracting jobs, get acquainted with the wide scope in concrete surfacing operations offered by the JACKSON SC-4A vibratory hand screed. Its advantages include lightweight, uniform vibration and adaptability to reasonable widths of section. Gives complete puddling to low-water content concrete. Write for further details.

ELECTRIC TAMPER & EQUIPMENT CO.
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How to design and erect movable and long-span bridges

Here is another of Hool and Kinne's authoritative and time-saving data and methods books for engineers, now fully revised and brought up to date with the addition of much new material on advanced practices and standards in the field of steel bridge construction

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MOVABLE AND LONG-SPAN STEEL BRIDGES

Revised by R. R. Zipprodt, Principal Civil Engineer, Office of the Quartermaster General, and H. E. Langley, Bridge Engineer, New Hampshire State Highway Department

Compiled by a number of specialists, this book brings you authoritative information in each of the subjects it covers—makes available such practical working helps as design calculations, construction features, complete structural design data, effective methods, selection, adaptability, and relative economy of different types of bridges. Facts, diagrams, standards, formulas, design specifications, examples from practice, important code requirements, etc., are all arranged conveniently for study, reference, or quick-consultation in relation to specific bridge design or erection problems.

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497 pages, 345 illustrations, $5.00

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- Analysis of Fixed Arches
- Analysis of Two-hinged Arches

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Send me Hool and Kinne's Movable and Long-span Steel Bridges for 10 days' examination on approval. In 10 days I will send $5.00, plus few cents postage, or return book postpaid. (We pay postage on orders accompanied by remittance.)

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MANUFACTURERS' ACTIVITIES

Appointment of W. W. Galbreath as executive vice-president of the Pressed Metal Institute is announced by George E. Whitlock of Mullins Manufacturing Company, president of the Institute. For many years president of Alliance Porcelain Products Company, Mr. Galbreath is well known in the steel and stamped metal industries. In his new post he will give special direction to Institute postwar problems and planning. Headquarters of the Pressed Metal Institute have been transferred from New York to Cleveland, Ohio, in order to facilitate service to members and to expedite the work of Research Committee now being organized. The Cleveland Office is located at 829 Union Commerce Building.

S. J. Hatchett for the past 27 years manager of the Vancouver, B. C., branch of Canada Metals, Ltd., has been appointed manager for western Canada with headquarters at Winnipeg, Man.

Davey Compressor Company, Kent, Ohio, has recently appointed Eighmy Equipment Company, Rockford, Ill. as a franchise dealer in Davey portable and industrial compressors, truck power takeoffs and pneumatic saws. B. O. Eighmy is widely known in western Illinois and Wisconsin, the area in which his firm distributes and rents material-handling and construction equipment to contractors. The addition of the complete line of Davey-engineered products widens the service rendered to contractors by Eighmy Equipment Company.

Appointment of C. A. Smith, a Westinghouse Electric & Manufacturing Company employee for more than 50 years, as assistant to the vice-president of the East Pittsburgh divisions, has been announced by W. G. Marshall, vice-president of industrial relations.

William E. Curran, connected with the Rheem Manufacturing Company, Birmingham, Ala., branch, prior to his transfer to Danville, Pa., as plant manager early in 1943, and later promoted to the same position at the company's Richmond, Calif. operations, has been elected a vice-president of the company in charge of production and plant operations, with headquarters at Richmond, Calif. Prior to his connection with the Rheem Company he was with the Republic Steel Corporation in Birmingham, Ala.

PRODUCING MORE VITAMINS: Vitamins pack the extra punch needed in emergency rations for the armed forces, keep production workers on the home front healthy. A rich source of Vitamin B_1 is found in the fermentation wastes of distilleries. The recovery, purification and concentration of these body-building substances is possible with AMBERLITE Ion Exchange Resins. The use of distillery wastes as a source is actively being investigated.

MUNITIONS FROM WASTES: Tartaric acid—vitally needed in the manufacture of munitions, photographic materials and other specialized applications is present in large quantities in wine wastes. The recovery of tartaric acid by the AMBERLITE process promises to be an economical source for a large proportion of the nation's enlarged needs.

GREATER SUGAR YIELD: One of the problems of long standing in the sugar industry has been the relatively high percentage of syrup which could not be crystallized due to the presence of salts and other impurities. AMBERLITE Ion Exchange units in use are producing more sugar per ton of cane or beets by permitting the purification of the sugar juices to a far greater extent than has been possible by present refining methods.

AMBERLITE
ion exchange resins are doing jobs like these

IN water conditioning, the AMBERLITES have proven their capacity for producing large volumes of very pure water at low cost. Today, paper and textile mills, synthetic rubber units, food plants, tanneries and laundries are among the many industries being served by these unusual synthetic resins.

The use of the AMBERLITES in specialized applications is opening up a whole new field of industrial uses. Valuable metals, for example, can be recovered from industrial wastes; drugs and pharmaceuticals can be purified; harmful metal ions can be removed from solutions of organic materials—these are but a few of the potential uses for the AMBERLITE Ion Exchange Resins. Since the number of specialized applications already under consideration indicates the tremendous latent possibilities of these products, your own industry may find the AMBERLITES the answer to a difficult problem.

If you want complete technical data and assistance in the use of the AMBERLITE Ion Exchange Resins, our technical staff will be glad to consider your problem without obligation.

THE RESINOUS PRODUCTS
& CHEMICAL COMPANY
WASHINGTON SQUARE, PHILADELPHIA, PA.

Speed-up

.. for bigger yardage and lower costs

...with Heil Hi-Speed Cable Scoops

These big 15-yard tractor scoops are push-loaded in 40 to 50 seconds. They haul at travel speeds up to 20 miles per hour. And that's speed in any language! ... Tilting floor gives positive mechanical pushout from the bowl, spreads loads evenly. The matched tractor-scraper unit accelerates fast — steers without effort, by hydraulic power — turns on a dime — stops safely where you want it, with individual and unit-controlled air brakes. Fast, positive Heil Cable Control of the scoop ... It's an operator's dream — and its extra speed on long hauls often represents the difference between a profit and a loss for you. With this modern equipment, you're the fellow with a reputation for "cutting the mustard". Get in early on post-war waiting list. Write for bulletins.

R-18

ARMY E NAVY

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NEW TRADE PUBLICATIONS

"Forty Years of Service"—A very handsome 30-page booklet with the foregoing title has been issued by the Continental Rubber Works, Erie, Pa., in commemoration of the company's fortieth anniversary. It was prepared by C. J. Palmer, secretary of the company and son of its founder and president, Theron R. Palmer. From the printing standpoint it is unusually attractive with its embossed cover and many fine drawings and photographic illustrations. The foreword is by Theron R. Palmer, and the succeeding pages tell the history of the company, and describe the many interesting processes used and the valuable materials produced by the company.

Rubber Products—Described in a catalog of industrial rubber goods are hundreds of mechanical rubber products and other special items, many available only for postwar use. Particular emphasis is given belts, hose, molded goods, packing, lathe cut and extruded rubber goods, friction material, rubber covering and abrasive wheels. Also contained in the catalog are engineering data on belting and hose, and technical information on other products.—*The Manhattan Rubber Mfg. Division, Passaic, N. J.*

Grease and Scum Removal—A 4-page leaflet describes a vacuator, a unit developed for the removal of grease, scum and light solid fractions which have heretofore been difficult to handle in raw sewage and trade wastes.— *The Dorr Co., Inc., 570 Lexington Ave., New York 22, N. Y.*

Indoor Climate—A large booklet describes a program for the improvement of heating, cooling and air conditioning in the interest of public health and greater indoor comfort.—*Indoor Climate Institute, New Center Bldg., Detroit 2, Mich.*

MEETINGS

THE ASSOCIATED EQUIPMENT DISTRIBUTORS, international association of construction machinery dealers, will hold its twenty-fifth annual meeting at the Edgewater Beach Hotel, Chicago, Ill., Jan. 17-20.

AMERICAN SOCIETY OF CIVIL ENGINEERS, annual meeting, 33 West 39th St., New York, N. Y., Jan. 19-21.

AMERICAN ROAD BUILDERS' ASSOCIATION, 41st annual convention, Edgewater-Beach Hotel, Chicago, Ill., Feb. 1-3.

REGIONAL AND LOCAL MEETINGS

HIGHWAY ENGINEERING CONFERENCE, University of Colorado, Boulder, Jan. 7.

COLORADO SOCIETY OF ENGINEERS, 28th annual convention, Shirley-Savoy Hotel, Denver, Colo., Jan. 7-8.

LOUISIANA ENGINEERING SOCIETY, annual meeting, St. Charles Hotel, New Orleans, La., Jan. 13-15.

OKLAHOMA SOCIETY OF PROFESSIONAL ENGINEERS, 9th annual meeting, Mayo Hotel, Tulsa, Okla., Jan. 14-15.

ASSOCIATED GENERAL CONTRACTORS OF MISSOURI, annual meeting, Statler Hotel, St. Louis, Mo., Jan. 18-19.

CANADIAN CONSTRUCTION ASSOCIATION, annual meeting, Chateau Frontenac, Quebec, Canada, Jan. 19-21.

PURDUE ROAD SCHOOL, Purdue University, Lafayette, Ind., Jan. 24-26.

TEXAS WATER WORKS AND SEWAGE SHORT SCHOOL, 26th annual meeting, Texas A. & M. College, College Station, Tex., Jan. 31-Feb. 2.

WISCONSIN COUNTY HIGHWAY COMMISSIONERS ASSOCIATION, annual road school, Schroeder Hotel, Milwaukee, Wis., Jan. 25-27.

N. Y. STATE COUNTY HIGHWAY SUPERINTENDENTS ASSOCIATION, Albany, N. Y., Jan. 27-28.

CONSTRUCTORS ASSOCIATION OF WESTERN PENNSYLVANIA, annual meeting and dinner. Hotel William Penn, Pittsburgh, Pa., Feb. 1.

SOUTHEASTERN ASSOCIATION OF STATE HIGHWAY OFFICIALS, annual meeting, Hotel Roanoke, Roanoke, Va., Feb. 9-10, 1944.

MICHIGAN HIGHWAY ENGINEERING CONFERENCE, 30th annual meeting, Grand Rapids, Mich., Feb. 8-March 1, 1944.

... or if it's a Bottom-Dump Trailer Wagon you need ... this new Heil Unit breaks all the speed records

High-clearance doors operate on clamshell principle...

35 inches clearance—with doors wide open — is really something! There are no doors dragging in the dirt — nothing to slow up the unit. The operator turns off the windrow at sharp angles wherever he chooses ... Dumping is under fingertip control ... all in one heap, or with an even spread that looks almost like the work of a cable scraper. Doors are *power-opened* — in 2 seconds — under cable control (they *close* by gravity) ... If you want to see a big smile on your operator's face give him this new equipment to work on ... watch him dump and get away in a flash ... then do a little figuring on what this means to you in dollars and cents and a reputation for clean-looking, on-time completions. Get yourself a *post-war "priority"* by ordering now.

Write for bulletins.

Note: Tractor unit can be ordered to operate interchangeably with cable scraper on facing page. R-17

Heil
Earth Moving Machinery
Trailbuilders • Bulldozers • Cable Scrapers • Sheepsfoot Tamping Rollers • Hi-speed Wheel Tractor with Semi-trailer Scraper or Semi-trailer Bottom Dump Wagon.

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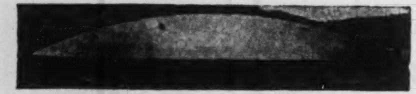
SYSTEM

Crackless Concrete Construction

THE patented Preload system of tank construction permits substantial economy in steel and concrete, with consequent savings in cost. Under the Preload system the concrete is permanently maintained in horizontal and vertical compression, thereby completely eliminating cracking or leakage.
Included among the 500 Preload tanks in service are the largest concrete surface tank, largest concrete standpipe, and largest self-supporting concrete dome.

DESIGNERS and BUILDERS of PRELOAD TANKS, ELEVATED TANKS, STANDPIPES, DOMES, PRESSURE VESSELS and CONTAINERS, and CARRIERS of LIQUIDS and DRY CHEMICALS



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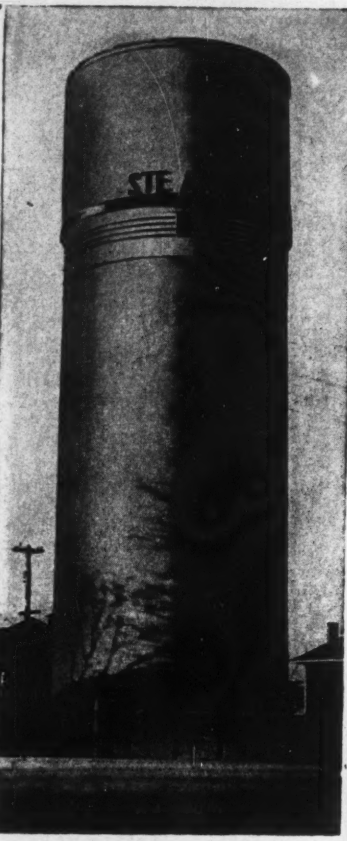

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excellent facilities are available for
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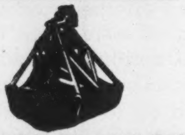
DELAWARE BAY SHIPBUILDING CO., INC.
LEESBURG, NEW JERSEY

Hayward Buckets



Use this Class "E" Clam Shell Bucket for handling crushed stone, gravel, sand and other bulk materials.
THE HAYWARD CO., 40-50 Church St., N. Y.

NEED A BIG Trailer?
La Crosse Makes Them Up To 200 Ton Capacity-
★★ WRITE OR WIRE ★★
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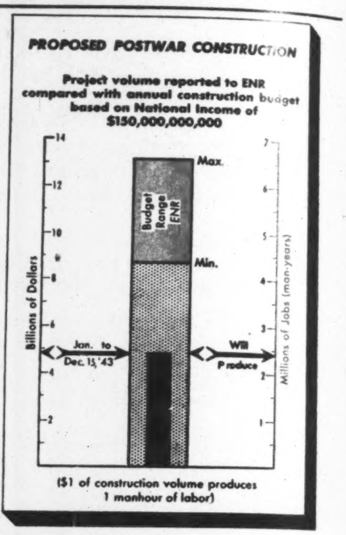
POSTWAR PROJECTS



Projects proposed for postwar construction have been published in these columns since January, 1943 as they have been reported to Engineering News-Record.

The chart above shows, both in estimated dollar volume and in jobs or man-years of labor, how fast this reservoir of future work is filling up.

If you or your community are working on projects that have not yet been included in this "postwar reservoir," please send us an itemized list and description of them, including estimated cost and the names of the engineers who are at work on the plans. Then as you watch the arrows climb you will know that you and your community are contributing to the success of the NUMBER ONE JOB of preparing for peace.

Address your projects list to Manager, Business News Department, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

MINIMUM SIZE OF PROJECTS PUBLISHED

Public Works	$25,000
Industrial Buildings	40,000
All Other Buildings	150,000

WATERWORKS

★**Calif., Oakland**—East Bay Municipal Utility Dist., 512 16 St., laying 240 mi. new pipe throughout district, (Alameda and Contra Costa Counties) $3,258,000; enlarging 2 filter plants located at Orinda and Lafayette, $592,000; 2 distribution reservoirs, 40 million gal. capacity each, located in East Oakland and north Richmond; 6 concrete reservois in Berkeley and Oakland, $921,000; imprv. spillways at dams in San Pablo and Lafayette, $85,000.

N. Y., Larchmont—Village, making plans extending water distr. mains. $40,000. State Planning Aid funds allocated. A. Richards, village engr. CD 12/15.

N. Y. Lockport—City, exten. water distr. sys., $335,000; auxiliary water supply pump. sta., $75,000. State Planning Aid funds allocated.

N. Y., Silver Springs—Village, reservoir, pipeline, municipal water sys. $29,000. State Planning Aid funds allocated.

N. Y., Saratoga Springs—City, watermains, Circular St. $45,000. State Planning Aid funds allocated.

O., Barberton—City, water plant filters $150,000, watermains $145,200. H. Bushey, City Hall, city engr.

O., Canton—City, water supply sys. Over $15,000. J. Shisler, city engr.

★**O., Cleveland**—City Planning Comn., City Hall, plans completed watermain, St. Clair Ave. London Rd. to E. 222 St., $520,000; plans partially completed Granger Rd., Bdwy. to Turney Ave., $200,000; Independence Rd., Pershing to Dille Aves., $18,000; Riverside Dr., Brookpark to Sheldon Aves., $273,000; Rockefeller Rd., Euclid Ave., E. 280 St., Ridge and Rockefeller Rds., $343,000; Tiedeman Rd., Brookpark Ave. to W. 106 St., $443,000; Wagar Rd., Center Ridge Rd. to Detroit Ave. in Rocky River, $34,000; Division-Clinton Rd., Div. Pumping Station S. to Jasper Ave., $966,000; plans not yet started Carnegie Ave., E. 40 to E. 108 Sts., $378,000; E. 37 St., Woodland to Pershing Aves., $245,000; E. 65 St., Superior to Carnegie Aves., $224,000; E. 71 St., Grant Ave. to Canal Rd., $39,000; Fenwick Ave., W. 40 to W. 65 Sts., $64,000; Front St. from Lakeside N'ly. then

CONSTRUCTION REPORTS

Compiled by Business News Department—Engineering News-Record, 330 W. 42nd St., New York
ELSIE EAVES, Manager *SCOTT McLEOD, Statistician*
(Daily service also available—Write for details)

WATER SUPPLY

PROPOSED WORK

Kan., Kansas City—F. W. Balke, city mgr., City Hall, pump house. $40,000.

Ia., Plainfield—W. W. Taylor, mayor, plans election to vote bonds, water and sewerage sys. imprvs. $25,000.

Md., Baltimore—City, City Hall, making plans water circulating sys. in Pikesville. $53,000. Bureau Water Supply, Municipal Office Bldg., engrs.

Okla., Oklahoma City—W. B. Cunningham, water supt., City Hall, cleaning, repairing, imprv. filters at water filter plant. $25,000. V. V. Long, Colcord Bldg., Oklahoma City, consult. engr.

Wis., Galesville—City, W. R. Shonat, clk., City Hall, making plans addnl. water supply, incl. new well, pumps, pump house, piping, etc. General Engrg. Co., Portage, engr.

Wis., Sparta—City, H. L. Beckman, clk., water sys. exten., new mains, well. Applied for federal aid. O. O. Bergman, City Hall, city engr.

†Tex., Abilene—W. W. Hair, mayor, City Hall, WW imprvs., Tex. 41-657, $222,000. **FWA.** Freese & Nicholas, Capps Bldg., Fort Worth, engrs. CD 12/2—ENR 12/9.

†Tex., Fort Worth—S. H. Bothwell, city mgr., City Hall, water facilities, incl. pump facilities, $103,962. **FWA.** Freese & Nichols, Capps Bldg., engrs. CD 10/14—ENR 10/21.

Ont., Timmins—Municipality, A. L. Shaw, clk., flitration plant. $35,000. J. McLean, Town Hall, engr.

BIDS ASKED

Bids Asked January 7

Minn., Richfield—E. J. Prondzinski, archt., 949 Plymouth Bldg., Minneapolis, drilling well, furnishing, installing pump. equip. and pump enclosure, for Village, G. Soberg, clk. R. Bloom, Sexton Bldg., Minneapolis, engrs. CD 12/15—ENR 12/28.

Bids Asked About January 10

†Tex., Killeen—Federal Works Agency, 702 Electric Bldg., Fort Worth, addnl. water lines, facilities, Tex. 41-548, $58,200. F. J. Von Zuben, 1606 Mistletoe Dr., Fort Worth, engrs. CD 12/21—ENR 12/23.

Bids Asked January 11

†Tex., Amarillo—J. A. Jenkins, mayor, City Hall, WW imprvs., removing, resetting one 4.m.d. pump and installing one 8 m.g. d. pump incl. necessary appurtenances, transportation, Tex. 41-569, $25,000. Plans deposit $10. Freese & Nichols, Capps Bldg., Fort Worth, engrs.

CONTRACTS AWARDED

†N. M., Fort Sumner—U. S. Eng., 4 and Gold Sts., Albuquerque, addnl. water lines, facilities, Sol. No. W 29, 005-Eng.44-90, to Lembke Const. Co., 324 N. 3 St., Albuquerque, **$16,280.** CD 11/19—ENR 11/25.

†Okla., Camp Gruber (br. Muskogee)—U. S. Eng., 416 Wright Bldg., Tulsa, Zone 2, emergency water supply sys., Sol. 34-066-44-32, to H. J. Heppel & Co., Muskogee, **$31,100.** CD 12/13—ENR 12/16.

Okla., Oklahoma City—H. E. Bailey, city mgr., installing dewatering equip., to Earl W. Baker Co., Britton, **$40,000.** V. V. Long & Co., Colcord Bldg., engrs.

Tex., Dallas—City, approx. 17,000 lin. ft. 6 in. B & S c.i. water pipe, to American Cast Iron Pipe Co., 2424 Myrtle Ave., Dallas, **85c.** lin. ft.

Ont., Hamilton—Municipality, 6- to 18-in. watermains, day labor. **$15,920** voted. W. L. McFaul, City Hall, engr.

SEWERS, WASTE DISPOSAL

PROPOSED WORK

N. Y., Tonawanda—Town Clerk, Municipal Bldg., Delaware Ave., Kenmore, construction, enlargement incinerator plant. $100,000. Nussbaumer & Clarke, Inc., 327 Franklin St., Buffalo, engr.

†R. I., Middletown—Federal Works Agency, 999 Chauncy St., Boston, Mass., plans ready in February, 3,700 ft. 8- to 18-in. sewer lines, Private Way crossing Beacon and Maple St., R. I. 37-165. Jenks & Ballou, 2600 Industrial Trust Bldg., Providence, engrs. $80,000. **(Correction**—location of project.) CD 11/5—ENR 11/11, under Newport.

Location of ENR Correspondents

Symbols and Abbreviations Include:

†	Federal Government
★	Project of $500,000 or over
ENR	Engineering News-Record
CD	Engineering News-Record Construction Daily
A-E-M	Architect-Engineer-Management type of contract

Projects—By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger: water supply, earthwork, waterworks, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

Classes of Construction

(Named in order of Listing)

Water Supply
Sewers, Waste Disposal
Bridges
Streets & Roads
Earthwork, Waterways
Unclassified
Latin America
Public Buildings
Commercial Buildings
Industrial Buildings

Stages Reported

PROPOSED: (except Streets & Roads):

BIDS ASKED (new announcements only. For full calendar, see also preceding issues of ENR);

LOW BIDDERS: On jobs below $500,000 value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.

CONTRACTS AWARDED: Except awards to low bidders previously reported in low bidder stage.

Dates shown are of issue in which last previous report was published.

Note: To comply with censorship requirements, addresses on some reports are being generalized. Data which would reveal the purpose of the improvements and the size are withheld. The name of contractor and general area are reported.

Tex., Houston — Bids soon, new sanitary sewer line from 2200 Blk. Ruth St. to Dowling to Wheeler, $64,000.

Utah, American Fork—City, City Clerk, sanitary sewerage sys., **FWA.** Caldwell & Richards, Templeton Bldg., Salt Lake City, engrs.

BIDS ASKED

†Tex., Killeen—Federal Works Agency, 702 Electric Bldg., Fort Worth, addnl. sanitary sewer collection lines, out fall sewer, etc., Tex. 41-548. $90,525. F. J. Von Zuben, 1606 Mistletoe Dr., Fort Worth, engr. CD 12/20—ENR 12/23.

Bids Asked January 11

Wis., Brookfield—Greenfield Heights Sanitary Dist., R. 5, Waukesha, sewage treatment plant. H. C. Webster & Son, 730 N. 2 St., Milwaukee, Zone 3, engrs. CD 12/2—ENR 12/9.

LOW BIDDERS

Calif., South Gate—Los Angeles Co., Hall of Records, Los Angeles, sanitary sewer, Facade Ave., C.I. 1086, from R. Vlacich, 2314 Carlyle Pl., Los Angeles, **$29,271.** A. Jones, Hall of Records, Los Angeles, engr.

†Ill., Carterville—J. W. Hayton, mayor, City Hall, Dec. 14, sewerage sys. and completion treatment plant, Ill. 11-256, from E. J. Fisher, 4134 Westminster St., St. Louis, Mo., **$60,280.** Est. $72,618, **FWA.** CD 12/7.

O., Euclid—City, M. Spino, dir. Pub. Serv., 585 E. 222 St., 3,500 ft. 60 in. rein.-con. sewer line in E. 222 St. and Lake Shore Blvd. to sewage disposal plant, Section A, from Garfield Constr. Co., 11700 Willard Ave., Cleveland, **$26,433.** Section B, from Kalill Co., 4161 W. 150 St., **$41,575.** CD 7/9—ENR 7/15.

†N. C., Wrightsville Beach—Town, Dec. 9, sewerage sys., NC 31-262, from Calnaught Contg. Co., 328 Detroit St., Portsmouth, Va., **$221,042.** **FWA.** CD 11/30—ENR 12/2.

CONTRACTS AWARDED

Mo., Springfield—H. B. Carr, mayor, sanitary sewers, to R. McSwinney, 7401 Main St., Kansas City, Mo., **$126,830.** Bids 12/7. L. A. Weeks, City Hall, city engr.

†Mo., Springfield—City, City Clerk's Office, sanitary sewers, Docket Mo. 23-268, to R. MacSweeney, Kansas City, Mo., **$126,000.** **FWA.** Bids 12/7. CD 9/27—ENR 9/30.

†N. M., Fort Sumner—U. S. Eng. 4 and Gold Sts., Albuquerque, addnl. sanitary sewer lines, facilities, Sol. W 29-005-Eng-44-90, to Lembke Const. Co., 324 N. 3 St., Albuquerque, **$29,990.** CD 11/19—ENR 11/25, under WW.

O., Cleveland—F. Foy, city purch. agt., City Hall, replacing, repairing Jennings Rd. intercepting sewer line, 280 ft. 60 in. metal pipe and concrete retaining wall, to Domenic Nero Constr. Co., 12202 Superior Ave., **$38,562.** CD 10/19—ENR 10/21.

†Utah, Wendover—U. S. Eng., 580 S. State St., Salt Lake City, sanitary sewer and water supply sys., at Bombing and Gunnery Range, Wendover Air Base, to H. Lee, 118 W. 5th South St., Salt Lake City, **$31,555.** Bids 12/13.

Ont., Picton—Secy. Dpt. Munitions & Supply, Ottawa, sewage disposal plant at No. 31 Bombing and Gunnery School, for Dpt. Natl. Defense (Air), Ottawa, to Sterling Constr. Co., Ltd., 2494 Sandwich St. E., Windsor, about **$35,000.** Bids 12/2. CD 11/22—ENR 11/25.

BRIDGES

BIDS ASKED

Bids Asked January 5

Louisiana—State Hy. Dpt., D. Y. Smith, dir., Baton Rouge, fender reconstruction, etc., East Main St. bridge, SP 65-03-08, in Houma, Terrebonne Parish.

Bids Asked January 5

Louisiana—D. Y. Smith, dir. Dpt. Hys., Baton Rouge, 2,000 cu. yd. clam shell or as alternate 2,535 cu. yd. reef shell to be furnished spot dumped or Warren Canal-Forked Island Rd. (State Rd. 26 in Ward 6, S.P. 207-01-04 Vermilion Parish; 700 cu. yd. washed gravel to be furnished spot dumped on certain public roads S.P. 703-00-70, Morehouse Parish. Bids 11/10 rejected. CD 11/3.

Bids Asked January 7

Kentucky—Dpt. State Hy. Frankfort, access roads to timber area, 1 mi. from the Virginia Line to junction with Clover Fork Rd., 1.3 mi. Clover Fork Rd. at Razor Fork Creek, 3.7 mi. from junction with Ky. 160, approx. 6 mi. south of Lynch and extending westerly, DA-RM 14, Harlan Co.; 1.6 mi. Oil-Springs-Riceville Rd., beginning approx. 1.4 mi. north Riceville and exten. to mine loading ramp at Riceville, DA-RM 12, Johnson Co.; 2.5 mi. access road to mine area, beginning 2 mi. south of Grays and exten. southwardly DA-RM-15, Knox Co.

CONTRACTS AWARDED

†Del., Fort Miles—U. S. Eng., Penn Mutual Bldg., 6 and Walnut Sts., Phila., Pa., roads, Contr. 36-109-eng-217, to George & Lynch, Delaware Tribune Bldg., Wilmington, **$122,885.**

Georgia—State Hy. Dpt., Atlanta, repairing 20 existing timber bridges Brunswick-Savannah Rd., McIntosh, Liberty and Bryan Counties, to D. B. Scott & Co., Decatur, **$38,250.** Bids 12/7. Rejected bids Dec. 7, detour bridge, surface treated approaches at Sweetwater Creek on Austell-Alanta Rd., Cobb Co.

†O., Wright Field (br. Dayton)—U. S. Eng., Dayton, paving Skyline Drive Rds. 1 and 2, Contr. No. 33-046-eng-69, to Hinton & Smalley, Celina Est. **$104,030.**

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BRIDGES (Contracts Awarded, Cont'd.)

Utah—State Rd. Comn., Salt Lake Cit road mixed bituminous surfacing 6.05 m roadway between Tooele and Stockton, Tooe Co. to A. O. Thorne Constr. Co., Springvill **$77,903.** Est. $92,489. J. S. Evans, State Ca itol, state hy. engr.

STREETS AND ROADS

BIDS ASKED

Bids Asked January 4

N. Y., Staten Island—President Richmon Boro, Boro Hall, repaving with concre found. Richmond Hill Rd. from Richmon Ave. to Forest Hill Rd.

Bids Asked

Ohio—State Hy. Dpt., Columbus, rejecte bids Dec. 14, imprv. 0.441 mi. hy. Summit C Est. $12,300. CD 12/2—ENR 12/9.

LOW BIDDERS

†Calif., Wilmington—U. S. Eng., 751 Figueroa St., Los Angeles, Zone 14, Dec. 1 paving, Spec. 364, from Western Dredgin & Constr. Co., 412 W. 6 St., Los Angele **$48,297.**

Virginia—Dpt. Hys., Richmond, Dec. 2 imprv. 2.457 mi. Fauquier Co., from Black well Engr. & Constr. Co., Warrenton, **$75,00**

CONTRACTS AWARDED

California—State Div. Hys., Sacramento, re pairing 3 bridges across Torre Canyon, Vin cinte and Limekiln Creeks between 38 an 56 mi. south of Monterey, Monterey Co., t Kiss Crane Co., Box 161, Berkeley, **$24,525** Bids 12/15, awarded 12/21. CD 11/29—EN 12/2.

Georgia—State Hy. Dpt., Atlanta, grading pebble soil base 3.163 mi. Cordele-Abbevill Rd., Wilcox Co., to Nicholls Cont. Co., 119 Caroline St. N.E., **Atlanta, $46,389.** Bids 12/7

★ **†Ga., Dublin**—Yards & Docks, Navy Dpt. 18 St. and Constitution Ave. N.W., Wash D. C., roads, walks and services, etc., Spec 11832, NOY 951, to R. A. Bowen, Macon. Bi Items 1 and 9. **$682,033.** CD 12/16 under LB

Missouri—State Hy. Dpt., Jefferson City imprv. 0.205 mi. Holt Co., to O. W. Knutsen Constr. Co., 3537 Bway., **Kansas** City, Mo. **$26,234.** Bids 11/19, awarded 12/18. CD 11/10.

EARTHWORK, WATERWAYS

PROPOSED WORK

N. S., Shelburne—Dominion Govt., Ottawa Ont., jetty construction at Naval Base. $40,000. Dpt. Naval Services, Cartier Square Ottawa, Ont., engrs.

Ont., Blenheim—Harwick Twp., Blenheim Burke drainage scheme. $40,000.

BIDS ASKED

Bids Asked January 4

†Arkansas—U. S. Eng., U. S. Post Office and Courthouse, approx. 2,454,000 cu.yd. earthwork on Mississippi River, Chicot Co.

†Mississippi—U. S. Eng., U. S. Post Office & Courthouse, Vicksburg, approx. 1,715,00 cu.yd. earthwork on bank of Mississippi River, Washington Co. CD 11/18—ENR 11/2

Wis., Racine—H. A. Nelson, comr. P. Wks, City Hall, several sections emergency breakwater along south lake shore. Wm. J. Chadwich, City Hall, city engr.

Bids Asked January 5

Wis., Burlington—Degen Eng. Co., engrs. Burlington, 7,475 ft. open ditch, incl. 41,76 cu. yd. excav., for City.

Bids Asked January 24

†Colorado—Bureau of Reclamation, S. O. Harper, ch. engr., Mancos, furnishing, del. f.o.b. cars at the shipping point, f.o.b. car Mancos, or in stock piles at specified delivery point, approx. 6,200 tons sand and 3,300 tons coarse aggregate for Jackson Gulch Dam and inlet and outlet canals, Mancos Project, Spec. 1716-D.

LOW BIDDERS

★ **†California**—U. S. Bureau of Reclamation, Friant, Dec. 22, earthwork, structures Station 1050 plus 75 to Station 1926 plus 90 Madera Canal, Friant Div., Central Valley Proj., Spec. 1061, Schedule 1, from H. Earl Parker, 310 Eye St., Marysville, $172,075; Schedule 2, from A. Teichert & Co., Box 1113, Sacramento, **$456,306.** CD 11/26—ENR 12/2.

Delaware—State Hy. Dpt., Dover, Dec. 1 Contr. 840, Rehoboth Beach and Contr. 841, Bethany Beach groins, from Geo. E. Shockley, Rehoboth Beach, **$21,402.** CD 11/8—ENR 11/11.

CONTRACTS AWARDED

★ **Nebraska**—Central Nebraska Public Power & Irrigation Dist., 1500 Block West 2 St., Hastings, furnishing, placing on face of Kingsley Dam 25,500 tons rock spalls, 70,200 tons rock, rip rap, etc., to Tobin Quarries, Inc. 220 W. 29 St., **Kansas City, Mo., $518,206** CD 11/19—ENR 11/25.

RTHWORK (Contracts Awarded, Cont'd.)

Okla., Tulsa—U. S. Eng., 416 Wright Bldg., sa. Zone 2, floodway structures Blackboy ek. Sol. 34-056-44-23, to Ottinger Bros., roleum Bldg., Oklahoma City, $66,000.

Wash., Seattle—Yards & Docks, Navy Dpt., St. and Constitution Ave. N.W., Wash., C., erosion control, U. S. Naval Hospital, Y 8010, to W. G. Sattree and A. Gorud, E. 150 St., $38,670. CD 10/26.

UNCLASSIFIED

OPOSED WORK

a., Clinton—AIRPORT—City, L. Peterson, ., preliminary investigations airport. 0.000. Ben Anderson, City Hall, city engr. 11/17/42—ENR 11/19/42.

a., Hartley—AIRPORT—City, L. Skinkle, ., City Hall, airport, $50,000.

Louisiana—OIL WELL—Texas Mineral Land ., Rep. Bank Bldg., Dallas, Tex., drilling, veloping new 8,000 ft. test oil well, DeSota rish. Over $25,000.

Louisiana—OIL WELL, etc.—Continental Co., Ardis Bldg., Shreveport, drilling, deloping 9,500 ft. test oil well, earthen storage cilities, Jeff Davis Parish. Over $25,000.

Louisiana—OIL WELL—H. Hunt, et al, ke Charles, drilling, developing new 10,000 test oil well, Evangeline Parish. Over ,000.

Louisiana—OIL WELL—Texas Co., Picouewster Bldg., Shreveport, drilling, develop- new 11,500 ft. oil well, St. Mary Parish. er $25,000.

Louisiana—OIL WELL—Southwestern Oil fining Co., Lake Charles, drilling, develop- 12,000 ft. test oil well, Iberville Parish. er $25,000.

La., Houma—OIL WELL—Gulf Oil Co., mmercial National Bank Bldg., Shreveport, ., and Gulf Bldg., Houston, Tex., drilling, veloping new 8,000 ft. test oil well, over ,000.

Missouri — RAIL LINE — St. Louis-San Francisco Ry., F. G. Jonah, ch. engr., 906 ve St., St. Louis, laying new rail line beeen Jerome and Franks, $900,000.

†N. Y., Orangeburg—PIER—U. S. Eng., 120 all St., New York, Zone 5, pier. Project thdrawn. CD 12/20.

O., Cincinnati — PLAYGROUND — Imprv. ncoln Playground. $35,000. H. H. Kranz, ty engr.

†Oklahoma—City—ELECTRICAL FACILIIES—U. S. Eng., 416 Wright Bldg., Tulsa 2, ddnl. outdoor electrical facilities for airfield hting distr. sys., etc., Sol. 34-066-44-47. 5,000.

Texas and Oklahoma — OIL STORAGE ANKS—Stanolind Oil & Gas Co., Gulf Bldg., ouston, Tex., several addnl. steel oil storage nks. Over $25 000.

Texas—OIL WELL—Arkansas Fuel Oil Co., sperson Bldg., Houston, drilling, casing, deloping new deep test oil well, Pontias vest), Hidalgo Co. Over $25,000.

Texas—OIL WELL—Great Lakes Carbon orp., Geo. Skakel, 22 E. 40 St., New York, Y., drilling, developing approx. 4,500 ft. tary type oil well between Anson and Stamrd. Over $25,000.

Tex., Alto—OIL WELL, etc.—B. A. Skipper, al, Jacksonville, drilling, developing new 00 ft. test oil well, storage facilities. Over 5,000.

Tex., Anahuac—OIL WELL—Wynn Crosby rilling Co., Esperson Bldg., Houston, drilling, sing, developing new 11,000 ft. test oil well, rthen storage facilities, $45,000.

Tex., Andrews—OIL WELLS—Champlin Reing Co., Enid, Okla., drilling, developing 1 more deep test oil wells. Over $25,000.

Tex., Andrews--OIL WELLS—Champlin Reing Co., Enid, Okla., and Superior Oil Co., 1 W. 5 St., Los Angeles, Calif., drilling, deloping several deep test oil wells. Over $25,- 0.

Tex., Andrews—OIL WELL, etc.—Frank d G. Frankel, Commerce Bldg., Houston, illing, developing several deep test oil wells, rthen storage facilities.

Tex., Andrews—OIL WELLS—Gulf Oil rp., Gulf Bldg., Houston, drilling, develop- several deep test oil wells. Over $25,000.

Tex., Andrews—OIL WELL—Mid-Continent l Corp., Petroleum Bldg., Tulsa, Okla., drill- casing, developing several deep test oil ells, earthen storage facilities. Over $25,000.

Tex., Andrews — OIL WELLS — Sinclairrairie Oil Co., Midland, drilling, casing, deeloping several deep test oil wells, earthen ts, etc.

Tex., Andrews—OIL and GAS WELLS—tanolind Oil & Gas Co., Fair Bldg., Fort orth, drilling, developing several deep test l and gas wells, earthen pits, etc.

Tex., Andrews—OIL WELLS—Superior Oil ., Oil & Gas Bldg., Houston, drilling, develng 1 or more deep test oil wells. Over $25,- 0.

Tex., Andrews—OIL WELL, etc.—Texas Co., Fort Worth National Bank Bldg., Fort Worth, drilling, developing new 5,900 ft. test oil well, storage facilities, 4½ mi. northwest of here. Over $25,000.

Tex., Andrews—OIL WELLS—R. E. Williams, Midland, drilling, developing 1 or more 5 500 ft. test oil wells. Over $25,000.

Tex., Apple Springs—OIL WELL, etc.—American Liberty Oil Co., First National Bank Bldg., Dallas, drilling, developing new 5,200 ft. test oil well, storage facilities. Over $25,000.

Tex., Bainville—OIL WELL—D. R. Perkins & T. C. Hadley, 4110 Crane St., Houston, drilling, developing new 6,300 ft. test oil well, 1½ mi. southeast of here. Over $25,000.

Tex., Bastrop—OIL WELL—R. R. Ogden No. 1 Baker, et al, Bastrop, drilling, developing new 2,500 ft. test oil well, $25,000.

Tex., Bastrop—OIL WELL—O. G. Raesz, et al, drilling, casing, developing 1,500 ft. test oil well.

†Tex., Brooks Field—AIRFIELD BLDGS., etc.—U. S. Eng., Fort Sam Houston, equipment bldg., facilities at 4 Auxiliary Landing Fields.

Tex., Bruni—OIL WELL—Chas. E. Fraser, Inc., Laredo, drilling, developing new 3,250 ft. test oil well, 7 mi. south of here, $25,000.

Tex., Bruni—OIL WELL—Chas. E. Fraser, Inc., Laredo, drilling, developing deep test oil well. $25.000.

Tex., Clarkwood—OIL WELL—Lockhart Oil Co., Milam Bldg., San Antonio, drilling, Casing, developing new deep test oil well. Over $25,000.

Tex., Cold Springs—OIL WELL—Humble Oil & Refining Co., Humble Bldg., Houston, drilling, casing, developing 11,000 ft. test oil well, storage facilities, fuel line, $45,000 or more.

Tex., El Toro—OIL WELL—W. S. Boyle, State National Bank Bldg., Houston, drilling, developing 7,500 ft. test oil well, southeast of here. Over $25,000.

Tex., Freer—OIL WELL—Hiawatha Oil Co., Milam Bldg., San Antonio, drilling, developing 6,000 ft. test oil well. Over $25,000.

Tex., Ganado — OIL WELL, etc. — W. S. Boyle State National Bank Bldg., Houston, drilling, casing, developing new 6,000 ft. test oil well, storage facilities, 6 mi. northeast of here. Over $25,000.

Tex., Goliad—OIL WELL—G. E. Green, et al, drilling, developing deep test oil well, storage facilities, $25,000.

†Tex., Hondo—RADIO RANGE BLDGS.—U. S. Eng., Fort Sam Houston, 2 radio range bldgs.

†Tex., Harlingen—FIRING RANGES RELOCATION—U. S. Eng., 25 St. and Avenue F, Galveston, relocating firing ranges, roads, drainage at Harlingen Army Airfield, at Laguna Madre Ground Range, Sol. 41-243-44-C112. Over $25,000.

Tex., Jacksboro—OIL WELL, etc.—Kadane & Sons, Wichita Falls, drilling, developing 6,500 ft. test oil well earthen storage, fuel line, 10 mi. northwest of here. Over $25,000.

Tex., Karnes City—OIL WELL—Seaboard Oil Co. of Del., Continental Bldg., Dallas, drilling, casing, developing new 6,000 ft. test oil well. Over $25,000.

Tex., Laredo—OIL WELL, etc.—Adams Oil & Gas Co., Esperson Bldg., Houston, drilling, developing 7,500 ft. test oil well, storage facilities, fuel line, 20 mi. northeast of here. Over $25,000.

Tex., LaReforma—OIL WELL—Texas Co., 720 San Jacinto St., Houston, drilling, casing, developing new 8,500 ft. test oil well. Over $25,000.

Tex., Louise—OIL WELL—Salt Dome Oil Corp., Esperson Bldg., Houston, drilling, casing, developing new 4,600 ft. test oil well, 5½ mi. northwest of here. $25,000.

Tex., Lyford—OIL WELL, etc.—Standard Oil Co. of Kansas, M. Esperson Bldg., Houston, drilling 8,000 ft. test oil well, earthen storage facilities, fuel line. Over $25,000.

Tex., Mason—AIRPORT LANDING FIELD—Mason Co., voted bonds airport landing field, $75,000.

Tex., Moscow—OIL WELL, etc.—Humble Oil & Refining Co., Humble Bldg., Houston, drilling, casing, developing 10,000 ft. test oil well, storage facilities, fuel line, etc. Over $25,000.

Tex., Navidad—OIL WELL, etc.—Texas Co., 720 San Jacinto St., Houston, drilling, casing, developing new 6,000 ft. test oil well, earthen pits, etc. Over $25,000.

Tex., New Waverly—OIL WELL—W. E. Allen, et al, Northwest Hy., Dallas and Huntsville, drilling, developing new 7,000 ft. Wilcox test oil well, 4 mi. northwest of here. Over $25,000.

Tex., Ozona—OIL STORAGE TANKS, etc. —J. D. Hancock and W. E. Brown, 4029 Pineridge St., Houston, oil storage tanks and flow lines, Yates Field. Over $25,000.

Tex., Pearsall—OIL WELL—Highland Oil Co., Oil & Gas Bldg., Houston, drilling, developing new 4,000 ft. test oil well, storage facilities, $25,000.

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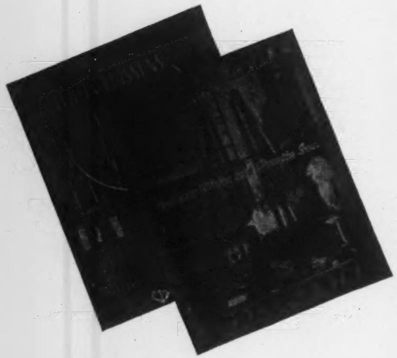

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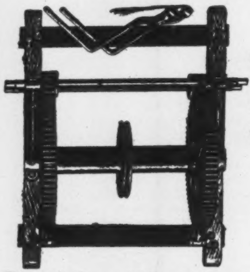

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UNCLASSIFIED (Proposed Work, Cont'd.

Tex., Pescadito-Laredo — OIL WELL Adams Oil & Gas Co., Esperson Bldg., Ho ton, drilling, completely developing 3 7,500 ft. test oil well, storage facilities, $ 000.

Tex., Petrolia—OIL WELL, etc.—Champ Oil Co., et al, Magnolia Bldg., Dallas, drilli developing new deep test oil well, storage cilities, etc. Over $25,000.

Tex., Petrolia—OIL WELL—Premier Refining Co. of Texas, et al. Mt. Olivet R Fort Worth, drilling, developing new 6,000 test oil well. Over $25,000.

Tex., Pittsburg—OIL WELL—Gulf Oil C Gulf Bldg., Houston, drilling, developing 7, ft. test oil well. Over $25,000.

Tex., Pledger—OIL WELL—Humble, Oil Refining Co., Humble Bldg., Houston, drilli casing, developing new 10,000 ft. test oil w 5½ mi. northeast of here, $50,000.

†Tex., Randolph Field—FENCING, etc.—U Eng., Fort Sam Houston, zone fencing, clea ing shop, racks, etc., $25,000.

Tex., Runge—OIL WELL—Continental C Co., Oil & Gas Bldg., Houston, drilling, dev oping new 7,000 ft. test oil well, 3 mi. sout east of here. Over $25,000.

Tex., San Perlita—OIL WELL—Standa Oil Co. of Kansas, M. Esperson Bldg., Housto drilling, developing 8,000 ft. test oil we Over $25,000.

Tex., Sequin—OIL WELL, etc.—J. H. Bu Lavernia, drilling, developing new 5,000 test oil well, earthen storage facilities, Guadalupe Co.

Tex., Stowell—OIL WELL—Gulf Oil Cor Gulf Bldg., Houston, drilling, casing, develo ing new deep test oil well. Over $25,000.

Tex., Texas City—THICKENER TANKS Texas City Tin Processing Co., addnl. rei con, thickener tanks. Over $25,000. Rob. Cummins, Bankers Mtg. Bldg., Houston, engr

Tex., Thompson—OIL WELL—Superior O Co. of California, Oil & Gas Bldg., Housto drilling, developing new 9,000 ft. test oil we earthen ground storage facilities. Over $25,0

Tex., Vernon—OIL WELL, etc.—Texas Co Fort Worth National Bank Bldg., Fort Wort drilling, developing 5,000 ft. test oil we earthen pits, etc., 16 mi. southwest of her $25,000 or more.

Tex., Zapata—OIL WELL—Coastal Refine ies, Inc., Alamo National Bldg., San Antoni drilling, developing new 3,500 ft. test oil we 12 mi. northeast of here, $25,000.

Utah, Helper—STORAGE TANK—E. Flai city recdr., City Hall, 2 m.g. concrete stora tank, $45,000. Applied for FWA gr. C. J. Ul rich, 422 News Bldg., Salt Lake City, engr.

★**†Va., Langley Field**—AIRFIELD BLDGS etc.—Civil Aeronautics Admin., 9 addn bldgs., utilities, $4,500,000.

Wis., LaCrosse—HANGAR—Fanta-Reed A Service, La Crosse, 1 and 2 story 68x80 f concrete block and wood trusses airpla hangar. Boyum, Schubert and Sorenseo Hoeschler Bldg., archts.

†Wyo., Cheyenne—RUNWAY EXTENSION U. S. Eng., 1709 Jackson St., Omaha, Neb 1,300 ft. exten. to runways and taxiway construction. $200,000.

★**Ont., Fort William**—HYDRO-ELECTRI UNIT—Hydro-Electric Power Comn. Ontario, 620 University Ave., Toronto, con structing, installing addnl. 18,000 hp. unit a Alexander Landing power plant on Nipigo River. $500,000.

Que., Hull—LANDING FIELD—Dominio Helicopter Transit Co. Ltd., 940 Dominion S Bldg., Montreal, landing field, $35,000.

Que, Verdun—TRAFFIC LIGHTS—Munic ipality, A. Burgers, clk., installing traf lights, $30,000. H. Hadley, City Hall, engr.

BIDS ASKED

Bids Asked In January

†Kan., Topeka—RAILROAD TRACKAGE U. S. Eng., 10 E. 17 St., Kansas City, Mo 3,500 yd. railroad trackage at Topeka Supp Depot Airbase.

Bids Asked After January 1

Texas — GAS WELLS—Arkansas-Louisian Gas Co., Marshall, Tex., and Slattery Bld Shreveport, La., drilling, casing, complete developing several gas wells, Carthage an Bethany areas, Panola Co., $100,000. C 12/15—ENR 12/23.

Bids Asked January 10

Alta., Suffield—VALUE HOUSE and GA SERVICES—Dpt. National Defense (Army Ottawa, Ont., value house and installing g services at experimental sta. and C.W. Train ing centre, drilling 2 natural gas wells a above centre. About $30,000.

Bids Asked In February

†Neb., Norfolk—PAVING RUNWAYS—Cit paving 262,500 yd. runways. CAA. CD 11/9 ENR 11/11.

LOW BIDDERS

†Calif., Blythe—HANGAR, etc.—U. S. Eng 751 S. Figueroa St., Los Angeles, Zone 14 Dec. 20, squadron hangar, sub-depot hanga and small arms storage bldg., No. 345, fro Jacobsen & Wickholm, 1614 Wellington Rd Los Angeles, **$225,629.**

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UNCLASSIFIED, etc. (Low Bidders, Cont'd.)

†**Calif., Wilmington**—TRACKAGE, etc.—U. S. Eng., 751 S. Figueroa St., Los Angeles, Dec. 16, trackage, etc., No. 330, from Clifford C. Bong & Co., 6 N. First Ave., Arcadia, **$34,006.**

†**Colo., Pueblo**—APRONS, etc.—U. S. Eng., 909 17 St., Denver, concrete aprons, paving, grading, Munitions Storage Depot from Williams & Stiel, 2530 E. Kentucky Ave., Denver, **$179,361.** CD 12/13—ENR 12/16.

★ †**Mass., Bedford**—HANGARS, etc.—U. S. Eng., 31 St. James Ave., Boston, hangars, grading, utilities, etc., No. 19-023-44-Neg-143, Middlesex Co., from John Bowen Co., 129 Newbury St., Boston, **$547,409.** Est. $800,000. CD 12/16—ENR 12/23.

Wash., Seattle — TRANSMISSION LINE RIGHT-OF-WAY CLEARING—City Light Dpt., City Light Bldg., Zone 1, Dec. 23, clearing 23 mi. transmission line right-of-way, from Halleran Bros., 2550 22 Ave. N., **$29,503.** CD 12/8—ENR 12/16.

CONTRACTS AWARDED

†**Calif., Benicia** — RAILROAD TRACK — U. S. Eng., 74 New Montgomery St., San Francisco, addnl. railroad track, Spec. 1255, to Ben C. Gerwick, Inc., 112 Market St., San Francisco, **$101,055.** Awarded 12/20.

Calif., Long Beach—RAIL REMOVAL, etc. —City, City Hall, removal rail from city streets and filling with concrete, Spec. R-1357, to J. K. Thomas & Byer Constr. Co., 611 Chamber of Commerce Bldg., Los Angeles, **$28,660.** G. E. Baker, City Hall, engr.

★ †**Calif., Muroc**—PARKING APRON—U. S. Eng., 751 S. Figueroa St., Los Angeles, Zone 14, addnl. parking apron, at Army Air Base, to Bressi & Bevanda Constructors, Inc., 206 W. 8 St., Los Angeles, and United Concrete Pipe Corp., 1347 W. 208 St., Los Angeles, **$1,000,000.**

†**Calif., Pacific Beach (Sta. San Diego)**—FACILITIES—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., addnl. facilities, A A T C, NOY 7278, to F. E. Young, 709 Bank of America Bldg., San Diego, **$116,400.**

†**Calif., San Bernardino**—AIRFIELD BLDG. —U. S. Eng., 751 S. Figueroa St., Los Angeles, Zone 14, bldg. for Reclamation Yard, paving and utilities at air depot, No. 339, to J. N. Robinson, 511 Base Line Rd., San Bernardino, **$69,679.**

†**Calif., South San Francisco** — AIRFIELD BLDG.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., terminal bldg. and boiler house, A A F, Mills Field, NOY 6782, to Parker Bros., 135 S. Park St., San Francisco, **$141,375.**

†**Colo., Colorado Springs**—FACILITIES, etc. —U. S. Eng., 909 17 St., Denver, addnl. facilities, temporary frame bldg., at Peterson Airfield, Contr. 05-016-Eng-156, to R. E. Wear & Son, Montrose, **$60,625.**

†**Fla., Daytona Beach**—TAXIWAYS—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., taxiways N. A. S., NOY 7963, to The Frank Constr. Co., Daytona Beach, **$41,979.**

†**Ga., Hunter Field**—AIRFIELD BLDG.—U. S. Eng., Post Office Bldg., Savannah, processing bldg., to Edwin Braun, 710 E. 50 St., Savannah, **$26,000.**

†**Ga., Thomasville**—TARGET BUTT and TAXIWAY—U. S. Eng., Post Office Bldg., Savannah, target butt and taxiway, Thomasville AF, Contr. 09-133-Eng-20, to The E. M. Watkins Co., P. O. Box 1237, Tallahassee, Fla., **$25,342.**

†**Ind., Crane** — AIR DEPOT DRAINAGE STRUCTURES, HEADWALLS — Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., headwalls for drainage structures, NAD, NOY 7579, to Maxon Constr. Co., 131 Ludlow St., Dayton, O., **$223,485.**

†**La., De Ridder**—SMALL ARMS RANGE—U. S. Eng., 25 St. and Avenue F, Galveston, Tex., small arms range, to W. R. Aldrich, Kalwrah University Gardens, Baton Rouge, approx. **$25,000.** Bids 12/13.

†**La., Lake Charles**—AIRFIELD BLDGS.—U. S. Eng., 25 St. and Avenue F, Galveston, Tex., temporary frame bldgs., at auxiliary airfield, Contr. No. 41-243-Eng-122, to T. Miller & Sons, Lake Charles, est. **$34,478.**

†**Me., Bangor**—AIRFIELD BLDG.—U. S. Eng., 31 St. James Ave., Boston, Mass., temporary frame airfield bldgs., incl. utilities, driveways, Contr. No. 19-023-Eng-213, Dow Field, to T. W. Cunningham, Inc., 61 Main St., **$25,700.**

★ **Montana**—TUNNEL—Northern Pacific Ry. Co., B. Blum, ch. engr., 176 E. 5 St., St. Paul, Minn., 2,850 ft. tunnel, 24 ft. wide, 24 ft. high, between Bozeman and Livingston, to J. C. Boespflug Constr. Co., Securities Bldg., Seattle, Zone 1, Wash. Est. over **$1,000,000.** CD 12/7—ENR 12/9.

†**Mont., Gore Field (br. Great Falls)**—AIRFIELD BLDGS—U. S. Eng., 800 3 Ave., Seattle, 4, Wash., airfield bldgs., Contr. 45-108-Eng-420, to Dudley-Anderson Co., Great Falls, approx. **$111,395.**

Nevada—SYSTEM POLE LINE—Union Pacific R. R., B. H. Prater, ch. engr., 1416 Dodge St., Omaha, Neb., 61 mi. L.T. system pole line between Caliente and Rock, to Strand Electric Co., 139 W. 2 So. St., Salt Lake City, Utah, approx. **$100,000.**

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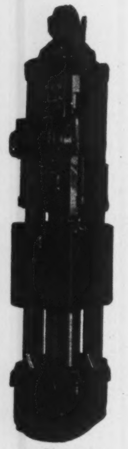

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UNCLASSIFIED (Contracts Awarded, Cont'd.)

†N. J., Jersey City—FENCES—U. S. Eng., 120 Wall St., New York, 5, N. Y., iron fences, to Union Fence Const. Co., 342 Madison Ave., New York, N. Y., **$25,000.**

N. J., Kearny—COKING OVENS—Koppers Coke Co., 60 E. 42 St., New York, N. Y., 2 coking ovens on wood piles with rein.-con. pile caps, to Koppers Const. Co., Koppers Bldg., Pittsburgh, Pa., **$35,000.**

†N. M., Hobbs—LIGHTING SYSTEM—U. S. Eng., Albuquerque, installing night lighting sys., Contr. 29-005-Eng-138, Hobbs Auxiliary Airfield, to Reynolds Elect. & Engr. Co., Inc., 708 N. Piedras St., El Paso, Tex. Est. **$66,163.**

†N. M., Fort Sumner—AIRFIELD FACILITIES—U. S. Eng., Albuquerque, addnl. facilities, Contr. 29-005-Eng-143, at auxiliary airfield, to Lembke Constr. Co., Albuquerque. Est. **$56,103.**

†O., Patterson Field (br. Fairfield)—94 AIRFIELD BLDG.—U. S. Eng., Wright Field, Dayton, frame bldg. facilities, Contr. No. 33-046-Eng-72, to McGraw Constr. Co., Inc., Middletown, **$172,205.**

†O., Wright Field (br. Dayton)—TANK—U. S. Eng., Dayton, tank, Contr. 33-046-Eng-71, to W. E. Caldwell Co., 200 E. Brandeis St., Louisville, Ky., **$27,034.**

†Okla., Oklahoma City—FACILITIES—U. S. Eng., 416 Wright Bldg., Tulsa, Zone 2, addnl. K facilities, utilities, bldgs., in Tinker Army Airfield Zone, Sol. 34-066-44-46. $25,000.

†Okla., Oklahoma City—AIRFIELD BLDG.—U. S. Eng., 416 Wright Bldg., Tulsa, Zone 2, low pressure chamber bldg., Will Rogers Field Zone, Sol. 34-066-44-30, to E. B. Bush Constr. Co., 3500 W. Reno St., **$33,000.** CD 12/7—ENR 12/9.

†Pa., Phila. — LIGHTING SYSTEM — U. S. Eng., 6 and Walnut Sts., lighting sys., Northeast Phila. Airport, Contr. No. 36-109-Eng-187, to Electric & Telephone Line Constr. Co., Rittenhouse and Greene Sts., **$32,012.**

†R. I., Davisville — SWIMMING POOL — Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., swimming pool, A B D, to E. Turgeon, 614 Turks Head Bldg., Providence, **$159,917.** CD 10/4.

†Tenn., Memphis—AIRFIELD BLDG.—U. S. Eng., Grant St., west of Westwood St., Mobile, Ala., bldgs., incl. electrical distr., air support and ferry command base, Contr. No. 01-076-Eng-129, to E. O. Korsmo Constr. Co., Porter Bldg., **$31,374.**

Texas — PIPELINE CARRIER — Arkansas-Louisiana Gas Co., Marshall, Tex., and Slattery Bldg., Shreveport, La., 10 mi. 16 in. steel pipeline gas carrier serving gasoline absorption plant in Carthage vicinity, separate contracts. **$65,000.** Est. $60,000.

†Tex., Amarillo — AIR-CONDITIONING — U. S. Eng., 231 W. Main St., Denison, airfield air-conditioning, to Matthews Engineering Co., 2122 Olive St., Dallas, approx. **$25,000.**

†Tex., Matagorda — FIRING-IN-RANGE — U. S. Eng., 25 St. and Avenue F, Galveston, firing-in-range, at Bombing and Gunnery Range, Matagorda Island, Contr. 41-243-Eng-121, to Collins-Bland Constr. Co., 1402 Preston St., Zone 21, Austin, **$34,105.**

†Tex., Pyote—NIGHT LIGHTING SYSTEM—U. S. Eng., Albuquerque, N. M., installing night lighting sys., Pyote AAF, Contr. 29-005-Eng-144, to Suggs Constr. Co., Big Springs, **$28,124.**

†Virginia — SECTION BASE FACILITIES, etc.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., general construction and addnl. facilities, section base and ammunition deport, Little Creek, NOY 6848, to Paul Smith Constr. Co., Inc., P. O. Box 1836, Norfolk, Zone 11. **$127,764.**

British Columbia—GROUND SERVICES, etc.—Dpt. National Defense (Air), Ottawa, Ont., ground services at R.C.A.F. Sta., hard surface runway, grading, drainage, etc., to General Const. Co. Ltd., Granville Island, **$83,000.**

B. C., Vanderhoof—AIRPORT—Dpt. Transport, Ottawa, Ont., addnl. airport development, incl. blading, grading, to Assiniboia Engineering Co., Ltd., Calgary, Alta. About **$31,300.**

Newfoundland, Gander—AERODROME DEVELOPMENT—Dpt. Transport, Ottawa, Ont., addnl. aerodrome development, grading, drainage, hard-surfacing, crushing and stockpiling stone, to McNamara Const. Co. Ltd., Industrial St., Toronto, Ont. About **$124,000.**

N. S., Dartmouth — AERODROME — Dpt. Transport, Ottawa, Ont., addnl. aerodrome development, incl. grading, smoothing, rolling, drainage, hard-surfacing, etc., to Acadia Constr. Co. Ltd., 101 Upper Water St., Halifax, about **$80,000.**

N. S., Debert (Truro)—OUTSIDE SERVICES — Dept. Natl. Defense (Air), Ottawa, Ont., outside services at Operational Training Unit, to J. N. Kenny, 130 Ray Bldg., Halifax, **$40,000.**

N. S., Sydney—NAVAL BASE FACILITIES—Dpt. National Defense (Sea) Ottawa, Ont., temporary crib retaining walls, etc., at Point Edward Naval Base, to A. E. Farley, 30 Russell Ave., Ottawa, Ont., **$38,000.**

N. S., Yarmouth—AERODROME DEVELOPMENT—Dpt. Transport, Ottawa, Ont., addnl. development aerodrome, grading, smoothing, rolling, drainage, hardsurfacing, to Tomlinson Constr. Co. Ltd., 21 King St. [illegible] Toronto, Ont. About **$41,000.**

Quebec — GROUND SERVICES, etc. — Dpt. National Defense (Air), installing ground services incl. clearing, grading, drainage, etc., to H. J. O'Connell, Ltd., Canada Cement Bldg., Montreal, **$35,000.** CD 11/18.

Ont., Port Credit (Toronto)—STORAGE TANKS—Goodrich Refining Co. Ltd., Port Credit, two 4 m.g. steel storage tanks at Lake Front, to Horton Steel Works, Ltd., Fort Erie, about **$113,500.**

LATIN AMERICA

Mexico, Juarez—City, c/o Jesus Vidales, pres. Municipal Imp. Bd., Juarez, plans paving for year 1944. $800,000 pesos (approx. $1,600,000 U.S.A. standard).

Mexico, Juarez—Juarez School Dist., Juarez, plans constructing group 3 public school bldgs., facilities for 1944. $300,000.

Mexico, Mexico City—Dpt. Pub. Educ., Mexican Federal Govt., R. T. Bonillas, secy., plans constructing, equipping agricultural school bldgs., facilities in every state.

PUBLIC BUILDINGS

PROPOSED WORK

†Arizona—Pub. Housing Auth., NHA, 785 Market St., San Francisco, Calif., 70 stop-gap dwelling units, Maricopa Co.

★ **†California**—Lockheed Aircraft Corp., 1705 Victory Pl., Burbank, plans by D. Parkinson, 433 S. Spring St., Los Angeles, bldgs. for navy plane service center, 2 hangars, warehouse, office bldg., etc. $2,500,000. Defense Plant Corp. will finance.

†Calif., Stockton—Home Owners' Loan Corp., 1440 Bway., Oakland, Zone 12, plans by V. Buckley, 155 Sansome St., San Francisco, converting residence at 525 N. San Joaquin St., into 7 living units for in-migrant war workers, Case W4G-176, $14,000; converting office bldg. at 41 Sutter St., providing 16 living units for in-migrant war workers, Case No. W4G-167, $32,000.

†Fla., Port St. Joe—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., plans by Reynolds, Smith & Hills, 10 S. Laura St., Jacksonville, 60 family dwelling units, Fla. 8231. CD 11/26—ENR 12/2.

†La., New Orleans—Pub. Housing Auth., NHA, 1205 Electric Bldg., 7 and Taylor Sts., Fort Worth, Tex., plans by Benson, Olschner & Spink, 1020 Carondelet Bldg., 500 unit family housing, La. 1-4. CD 12/3—ENR 12/9.

†Maryland—Pub. Housing Auth., NHA, Temporary Bldg. 2, 19 and D Sts. N.W., Wash., D. C., 100 unit family stop-gap housing, Md. 18276, St. Mary's Co.

Mich., Detroit—Wayne University Bd. Educ., 1354 Broadway Ave., plans by S. Pilafian, 112 Madison Ave., brick, steel, stone, concrete Student Center bldg., expansion program. Over $150,000.

†Mich., Pontiac—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, O., 75 unit single housing, Mich. 20227.

N. Y., Tonawanda—Town Clerk, City Hall, plans by Green & James, 250 Delaware Ave., Buffalo, municipal bldg. $150,000.

†Ore., The Dalles—Pub. Housing Auth., NHA, Skinner Bldg., 5 Ave. and Union St., Seattle, 1, Wash., 50 unit family stop-gap housing, Ore. 35289.

†Pa., Chester—Federal Works Agency, 101 Park Ave., New York, N. Y., plans by H. R. Robinson, 1927 11 St. N.W., Wash., D. C., community and recreation bldg. $300,000.

†Pa., Danville—Geisinger Memorial Hospital, plans by Wm. H. Lee, 1505 Race St., Phila., Pa., nurses home, $185,000, **FWA.** CD 10/29—ENR 11/4.

Pa., Harrisburg—Harrisburg Polyclinic Hospital, Harrisburg, plans by Laurie & Green, 111 S. Front St., nurses home addn. $150,000.

†Tex., Beaumont-Orange-Port Arthur—Pub. Housing Auth., NHA, 1205 Electric Bldg., Seventh and Taylor Sts., Fort Worth, plans by Stone & Pitts & Salisbury, McGinty & Werlin, 2017 W. Gray Ave., Houston, 100 stop-gap family dwelling units, Tex. 41-631.

†Tex., Camp Wolters (Mineral Wells)—U. S. Eng., 231 W. Main St., Denison, storehouse or warehouse, Sol. 41-242-44-134.

†Tex., Dallas—Bd. Educ., Akard and Royal Sts., 27 prefabricated school room units, facilities, utilities, etc. $100,000-$150,000. **FWA.** CD 11/22—ENR 11/25.

†Tex., Dallas—Methodist Hospital of Dallas, 301 Colorado St., 26 bldgs. for student nurses housing facilities, etc., Tex. 41-637, **FWA.** CD 10/14—ENR 10/21.

†Tex., Fort Clark (Brackettville)—U. S. Eng., Fort San Houston, photographic laboratory bldg. Over $150,000.

PUBLIC BLDGS. (Proposed Work, Cont'd.)

†Va., Franklin—Raiford Memorial Hospital, Inc., Franklin, sketches made by Rudolph, Cooke & Van Leeuwen, Arcade Bldg., Norfolk, 3 story, hospital addn. $164,000. **FWA.**

†Tex., Kelly Field (br. San Antonio)—U. S. Eng., Fort Sam Houston, unit for Jenny Cleaner Shop, $40,000.

†Tex., Matagorda—U. S. Eng., 25 St. and Avenue F, Galveston, school bldg., facilities, utilities, etc., for teaching bombers, Bombing Range Zone, Sol. 41-243-44-C111.

†Va., Newport News—City, plans by Williams, Coile & Pipino, Newport News, 2 story, bsmnt., brick, cinder block community recreation bldg., Wickham Ave. between 28 and 29 Sts., east side of Wickham Ave. $150,650. **FWA.**

★**†W. Va., South Charlestown**—City Clerk, City Hall, plans by H. S. Kyle, Union Bldg., Charlestown, hospital and nurses home, $700,000. **FWA.**

†Wis., Tomah—Bd. Educ, 80x140 ft. high school bldg. $350,000. **FWA.** Boyum, Schubert & Sorenson, Hoeschler Bldg., LaCrosse, archts. CD 6/23—ENR 7/1.

B. C., Brilliant—Province of B. C., c/o Dpt. Lands, Victoria, plans by Dpt. P. Wks., Victoria, jam mfg. and packing plant. $40,000.

N. B., Sackville—Regents of Mount Allison University, Sackville, residential bldg. and arena. $200,000.

★**Ont., Windsor**—Windsor Utilities Comn., J. C. Keith, genl. mgr., Metropolitan General Hospital addn. $500,000.

BIDS ASKED

Bids Asked After January 1

†Calif., Santa Monica—Home Owners' Loan Corp., 1151 S. Bway., Los Angeles, converting 80 apartments for war housing of 5 story, bsmnt. Elks Club Bldg., at 3005 Main St. $150,000. Gable & Wyant, 3723 Wilshire Blvd., archts.

Bids Asked January 6

†Ga., Brunswick—Pub. Bldgs. Admin., 18 and F Sts. N.W., Wash., 25, D. C., recreation bldg., Ga. 9-143. Tentative date. F. L. Abreu, 22 Marietta St. Bldg., Atlanta, archt. CD 12/13—ENR 12/16.

Bids Asked About January 12

†La., Alexandria—Pub. Housing Auth., NHA, 1205 Electric Bldg. 7 and Taylor Sts., Fort Worth, Tex., 35 unit dormitory housing, La. 16-097, and 35 unit family dwellings, La. 16-098. Barron & Heinberg, Guaranty Bank Bldg., archt. CD 12/8—ENR 12/16.

Bids Asked About January 30

†Tex., Baytown—General Tire & Rubber Co., 1708 E. Market St., Akron, O., (selected bidders) designing, fabricating, erecting structural steel pipe supports in synthetic rubber mfg. plant. Defense Plant Corp. will finance. CD 9/26—ENR 9/2.

Bids Asked February 9

N. Y., Willard—Comr. Mental Hygiene, State Office Bldg., altering lodge building for Nurses Training School, Willard State Hospital, Spec. 11760. Plans deposit $5.

Bids Asked

†Conn., Groton—Pub. Housing Auth., NHA, 24 School St., Boston, Mass., altering dormitories, Conn. 6013. Plans deposit $50 for first set and $10 for ea. addnl. set. CD 12/21—ENR 12/23.

†N. C., Monroe—Federal Works Agency, 606 State Planters Bank Bldg., Richmond 19, Va., public health center bldg., Proj. NC 31-267. Plans deposit $5. B. G. F. Laslett, Fayetteville archt. CD 11/1—ENR 11/4.

†N. C., Raleigh—Federal Works Agency, 606 State Planters Bldg., Richmond 19, Va., recreation bldg., S. Bloodworth St. $22,500 FWA gr. allot. J. M. Edwards, Jr., 102 W. Hargett St., archt.

LOW BIDDERS

★**†Calif., Herlong**—Pub. Housing Auth., NHA, 785 Market St., San Francisco, Dec. 21, 300 family dwelling units, Calif. 4794, and community bldg. serving housing, Calif. 4747, from James I. Barnes Constr. Co., Russ Bldg., San Francisco, **$670,000.** CD 12/7—ENR 12/9.

†Calif., Los Angeles—City of Los Angeles Housing Auth., 1401 E. First St., Dec. 21, 100 temporary dwelling units, Imperial Courts, Calif. 4780, for NHA, from E. P. Dentzel & Geo. H. Whyte, 825 Date St., Alhambra, **$197,780.** CD 12/8.

†Calif., Richmond—Federal Works Agency, Pub. Bldgs. Administration, Emergency Operations Unit, Wash., D. C., Dec. 23, Harry Ells Jr. High School, Calif. 4-520, from California Constr. Co., Inc., 230 California St., San Francisco, **$286,400.** CD 11/30—ENR 12/2.

CONTRACTS AWARDED

†Ariz., Litchfield Park—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., D.C., auxiliary acceptance unit, NOY 8077, to P. W. Womack Constr. Co., 1712 S. Central Ave., Phoenix, **$422,700.** CD 12/15 under LB.

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PUBLIC BLDGS. (Contracts Awarded, Cont'd.)

★ **†Ariz., Yuma**—U. S. Eng., 751 S. Figueroa St., Los Angeles, Zone 14, Calif., temporary bldg. constr., Army Air Force Advanced Flying School, to Del E. Webb Constr. Co., 302 S. 23 Ave., Phoenix, **$502,049.** CD 11/29—ENR 12/2, under LB.

★ **†Calif., San Diego**—Pub. Housing Auth., NHA, 2100 Linda Vista Rd., 1,600 temporary family dwelling units, Calif. 4782, to E. S. McKittrick Co., 7839 Santa Fe Ave., Huntington Park, **$3,201,508.** CD 12/8.

★ **†Ga., Dublin**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., personnel and service bldg., Spec. 11831 and addendum 1, NOY 6950, to Hardaway Contg. Co., Columbus, Bid Items 1 and 9, **$1,008,400.** CD 12/16 under LB.

★ **†Ga., Warner Robins**—Pub Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, 200 family dwelling units, Ga. 9156 and 360 family dwelling units, Ga. 9158, to R. M. Lee, 337 W. Peachtree St., Atlanta, **$926,401.** CD 7/20—ENR 7/22 under LB.

†Kansas—U. S. Eng., 10 E. 17 St., Kansas City, Mo., temporary frame bldgs., barricades, Contr. 23-028-Eng-290, Sunflower Ordnance Works, Johnson Co., to I. E. Millstone Constr. Co., 4343 Clayton St., St. Louis, Mo., **$124,200.**

†Me., South Portland—Pub. Housing Auth., NHA, 24 School St., Boston, Mass., fire protection, revision heating sys. alterations, Mountain View Housing, Me. 17038, to M. J. Murphy & Sons, 12 Portland Ave., Dover, N. H., **$27,070.** CD 12/21—ENR 12/23.

†Nebraska—U. S. Eng., 1709 Jackson St., Omaha, bus depot, lunch rooms, etc., at ordnance plant, to Green Bros. & Co., Sidney, approx. **$50,000.**

†N. J., Bellmawr—Pub. Housing Auth., NHA, 270 Bway., New York, 7, N. Y., constructing and installing heating sys. addns. at 500 unit housing, NJ 28024, to E. V. Turner, 51 Bank St., White Plains, N. Y., **$32,985.**

★ **†Ohio**—Lake City Malleable Co., 5000 Lakeside Ave., Cleveland, design and construction brick, steel malleable foundry, to Rust Engineering Co., Clark Bldg., Pittsburgh, Pa., **$3,360,000.** Defense Plant Corp will finance. CD 12/16—ENR 12/23.

†O., Cambridge—U. S. Eng., 522 U. S. Post Office & Courthouse, Cincinnati, remodeling barracks at Fletcher General Hospital, to R. Mast, Zanesville, approx. **$150,000.**

†O., Wright Field (br. Dayton)—U. S. Eng., Dayton, temporary frame bldgs., Contr. No. 33-046-Eng-70, to Frank Nesser & Sons, Inc., 2515 Burnet St., Cincinnati, **$322,903.**

†Pa., Phila.—Pub. Housing Auth., NHA, 270 Bway., New York, 7, N. Y., heating sys., imprvs., alterations, addns. Pa. 36013X, to E. V. Turner Co., 51 Bank St., White Plains, N. Y., **$76,735.** CD 11/18—ENR 11/18.

†Tex., Beaumont—Defense Plant Corp., 811 Vermont Ave. N.W., Wash., D.C., storage and miscellaneous bldg., to L. N. Fisher & Co., 419 Millikin Bldg., Decatur, Ill., approx. **$40,000.** Emergency Pipe Lines, Inc., Beaumont, will operate.

†Washington—U. S. Eng., 628 Pittock Blk, SW 10 Ave. and Washington St., Portland, Ore., processing and boxing bldg., Franklin Co., to Brennan & Cahoon, Pendleton, Ore., **$89,689.**

COMMERCIAL BUILDINGS

PROPOSED WORK

★ **Ore., Portland** — R. Borden and B. H. Nicholas, c/o J. D. O'Donnell, Bedell Bldg., 243 houses between N.W. 82 Ave. and Rocky Butte, south of Fremont St. $1,400,000.

Tex., Dallas—Lakewood Homes Co., Abrams Rd., 97 brick veneer, frame duplexes, Cole Manor Pl., N. Carroll, Atoka, Manett, Belmont and Calvin Sts. $380,000.

Tex., Dallas—Lakewood Homes Co., Abrams Rd., forty-four 1 story, frame dwellings. $175,000.

Tex., Houston—Santa Rosa Bldg. Co., 7803 Park Pl. Blvd., plans by J. Knostman, 4419 Coyle St., 68 masonry type dwellings, asphalt streets, utilities, curbs, gutters, etc. $350,000.

Wash., Spokane—Glenwood Homes, Inc., Box 1101, 44 houses on Bell St., Rowan, Sanson, Everett and Crown Aves. $176,000.

Wash., Spokane—Liberty Homes, Inc., P. O. Box 1101, 50 houses on Queen and Olympic Aves., Bell St. $200,000.

★ **Ont., Toronto**—Wellesley Hospital, M. T. Morgan administrator, Homewood Pl., plans by D. E. Kertland, 34 Summerhill Gardens, 6 story, wing addn. hospital. $500,000.

BIDS ASKED

Bids Asked About January 5

O., Cleveland—Eastern States Homes, Inc., A. Holzer, vice pres., 1336 Guardian Bldg., site imprvs., sewers, water lines, sidewalks, paving for housing at Babbitt and Tungsten Rds., F. A. Thomas, 585 E. 222 St., Euclid, engr.; for 128 housing development at W. 150 St. and Chatfield Ave., Alexander Crossett & Associates, 512 Fifth Ave., New York, N. Y., engrs.; for 322 housing development at 140 St. and Triskett Rd., Wight-O'Rourke Co., NBC Bldg., engrs. CD 10/7—ENR 11/4.

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COMMERCIAL BLDGS. (Cont'd.)

CONTRACTS AWARDED

Calif., Burbank—C. Courtney Jones, 2817 Victory Blvd., 91 frame, stucco dwellings, Owner builds, **$350,000.**

★**Calif., Lakewood Village**—Griffith, Walker & Lee, 2124 Marber St., 209 frame, stucco defense dwellings, Owner builds, Over **$500,000.** C. N. Aldrich, 1834 Dawson Ave., Long Beach, archt.

Calif., North Hollywood—Molmar Constr. Co., 4118 Camellia Ave., 18 multiple, frame, stucco dwellings, Owner builds, **$160,000.**

★**Md., Turners Station** — Day Village of Baltimore, 405 Lexington Ave., New York, N. Y., fifty-six 2 story brick dwellings containing 500 units, incl. 5 stores and project manager's home, to Day Construction Co., 109 E. 29 St., New York, N. Y. Est. **$1,350,000.**

Man., Winnipeg—Western Sales Book Co., Ltd., 7 Osborne St., 1 story, bsmnt., 180x200 ft., structural steel frame, brick wall office bldg., to Bird Constr. Co., Ltd., 708 Confederation Bldg. Est. about **$200,000.** L. J. Green, 310 Times Bldg., archt. CD 11/11—ENR 11/25.

INDUSTRIAL BUILDINGS

PROPOSED WORK

Conn., New Haven—FACTORY—Wire Rope Corp. of America, Inc., 464 Congress St., New Haven, 2 story, brick, steel factory. L. F. Caproni, 1221 Chapel St., engr.

Conn., West Haven—FACTORY—Armstrong Rubber Co., 475 Elm St., bids soon 3 story, 115x275 ft. rein.-con., steel factory. Over $40,000. Fletcher Thompson, Inc., 211 State St., Bridgeport, engrs. CD 11/24—ENR 12/9.

★**Idaho, Pocatello**—PLANT—J. R. Simplot, Caldwell, phosphate fertilizer processing plant, $500,000.

★**Michigan**—PLANT—Oldsmobile Div., General Motors Corp., S. E. Skinner, genl. mgr., Lansing, completing plans 3 bldgs. for forge plant addn. Over $1,000,000.

★**O., Bedford**—PLANT—Jack & Heintz, Inc., huge factory expansion program. $500,000.

Pa., Franklin—PLANT—Chicago Pneumatic Tool Co., new plant addn., Howard St. Over $50,000.

Tenn., Memphis—PLANT—Central Laboratories Plant, c/o Dr. S. J. Buckman, Brooks Ave., laboratory plant, destroyed by fire, $50,000.

Tex., Fort Worth—STORAGE BLDG., etc.—Stockyards Meat Market & Grocery, 2469 N. Houston St., plans by C. O. Chromaster, Century Bldg., concrete tile meat storage and store bldg., etc. $40,000.

Tex., San Juan—PACKING PLANT—Ninna-Beckwith Co., 423 Nebraska, 1 and 2 story citrus and vegetable packing plant, brick, frame, sheet metal. $40,000.

West Virginia — GAS DEHYDRATION PLANT, etc.—Hope Natural Gas Co., Clarksburg, natural gas dehydration plant, in connection with existing Bridgeport gas storage area, Harrison Co. $34,147; 1,000 hp. compressor, 2 high stage gas compressors and appurtenant equipment at Cornwell compressor station, Kanawaha Co., $162,631.

Alta., Edmonton—ROUNDHOUSE—Northern Alberta Railways Co., D. C. Coleman, pres., Montreal, Que., roundhouse at Dunwegan Yard. $42,000.

B. C., Dawson Creek—PLANT—Hasler Creek Coal Co. Ltd., coal mining plant and essential mining structures. $50,000.

B. C., Prince George—MILL—Phillips Lumber Co. Ltd., Freeman Bldg., saw mill, shingle mill, etc.

B. C., Prince Rupert—PLANT—Rupert Wood Co. Ltd., c/o Brown & Harvey, Besner Bldg., wood working plant.

Man., Winnipeg — PLANT BUILDINGS — Minneapolis-Moline Power Implement Co. of Canada, Ltd., 278 Riverton Ave., soon lets contract 1 story, 50x120 ft. and 1 story, 60x128 ft. bldgs., Riverton Ave. $53,000. CD 11/29—ENR 12/9.

N. S., Moosehead—MILL—A. White, Moosehead lumber and sawmill and associated mill.

Ont., Gore Bay—MILLS, etc.—George & Riching, Gore Bay, rebuilding planing mills and woodenware plant, destroyed by fire. $50,000.

★**Ont., St. Catherines**—PLANT—McKinnon Industries, Ltd., Ontario St., plans by A. E. Nicholson, 46 Queen St., altering bldg., etc., Ontario St. $718,310 equipped.

Que., St. Johns — FACTORY — Toussaint & Bros. Ltd., St. Johns, reconstructing factory. $40,000.

Ont., South Porcupine—MINE MILL—New Hoyle Gold Mines, Ltd., South Porcupine, mine mill and other structures. $70,000.

Ont., Sulphide—PLANT—Nichols Chemical Co., Ltd., Sun Life Bldg., Montreal, Que., plant addn., day labor. **$40,000.**

Ont., Toronto—FACTORY—Davenport Tool & Die Works, 1874 Davenport Rd., plans by C. W. Smith, 602 Jane St., 75x75 ft. factory, Dundas St., near Indian Road Crescent. $45,000.

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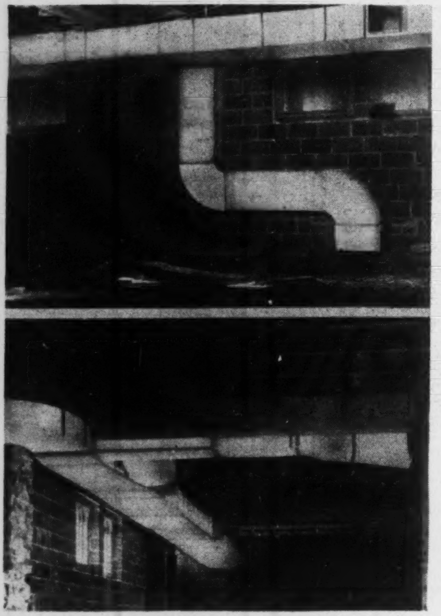

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INDUSTRIAL BLDGS. (Proposed Work, Con.)

Ont., Toronto—PLANT—Marani & Morris, archts., 46 Bloor St. W., soon lets contract, 1 story, 80x160 ft., structural steel, brick, tile Building 8, Shaw St., for York Knitting Mills Ltd., 79 Crawford St. $50,000.

Ont., Toronto—PLANT—Mastercraft Machine Products Ltd., c/o S. Strashin, 88 W. Richmond St., plant. $40,000.

Ont., Toronto—MILL HOUSE, etc.—Victory Mills, Ltd., Parliament and Fleet Sts., mill house, processing bldg., boiler plant, etc. $300,000.

Que., Mont Laurier—PLANT—Les Industrils de Mont Laurier, Ltd., Mont Laurier, forging plant, etc. $45,000.

Que., Montreal—FACTORY—La Cie D'Eau De Jarel Ltd., 4413 Marquette St., factory. $40,000.

Que., Montreal—PLANT—Minerals & Chemicals, Ltd., c/o D. Gilbert, 359 W. St. James St., developing and mining plant.

Que., Montreal—PLANT—Montreal Lodi Retreading Ltd., c/o A. Stalker, 240 W. St. James St., retreading, repairing and vulcanizing plant. $40,000.

Que., Quebec City—PLANT—High Rock Phosphates, Ltd., 71 St. Peter St., mining plant and necessary bldgs. $45,000.

Que., Roberval—SAW MILL—Roberval Lumber Ltd., Roberval, saw mill and wood products mfg. factory.

Que., Sorel—ABATTOIR—Saurel Abattoir Ltd., Sorel, abattoir and packing plant. $70,000.

LOW BIDDERS

Ont., Toronto—WAREHOUSE—G. W. Crothers, 1101 Millwood Rd., warehouse, from R. W. H. Binnie, 96 Bloor St. W. Est. **$40,300.** G. S. Anderson, 96 Bloor St. W., archt. CD 12/23.

CONTRACTS AWARDED

Calif., Burbank—Lockheed Aircraft Corp., 1705 Victory Pl., 2 run-up bldgs., Nos. 330 and 331, 100x360 ft. each., wood frame, stucco, to Kersey Kinsey, 12,345 Ventura Blvd., North Hollywood, **$108,294.** D. Parkinson, 433 S. Spring St., Los Angeles, archt.

N. J., Kearny—PLANT BLDGS.—Western Electric Co., 100 Central Ave., wash bldgs., etc., in various mfg. bldgs at plant, to F. & W. Engleberger Co., 159 Jeliff Ave., Newark, **$50,000.**

O., Canton—FACTORY—Hercules Motors Corp., 201 11 St. SE., 2 story factory addn., to Melbourne Bros. Constr. Co., Mellett Bldg., **$50,000.**

Pa., Jeannette—FACTORY—Pennsylvania Tire & Rubber Co., Jeannette, 1 story, 175x200 ft. factory, to Mahony-Troast Constr. Co., 657 Main St., Passaic, N. J. Est. over **$40,000.** Bids 12/15. CD 12/8—ENR 12/16.

★**Texas**—FACTORY—General Tire & Rubber Co., 1708 E. Market St., Akron, O., auto tire mfg. plant, to Brown & Root, Inc., P. O. Box 596, San Antonio, approx. **$3,200,000.** CD 11/1—ENR 11/4.

Tex., Carthage—PLANT—Arkansas Louisiana Gas Co., Marshall, Tex., and Slattery Bldg., Shreveport, La., absorption type gasoline plant 25,000,000 cu. ft. gas daily capacity, separate contracts. **$200,000.** CD 12/14—ENR 12/16.

Wis., LaCrosse—FACTORY—Bump Pump Co., 1830 West Ave. S., 2 story, 42x75 ft., concrete block, frame factory addn., to Peter Nelson & Son, 115 S. 4 St. F. J. Fuchs, 115 S. 4 St., archt.

Man., Winnipeg—PLANT—Can. Malting Co. Ltd., 7 William St., remodeling parts of plant, to Carter-Halls-Aldinger Co. Ltd., 400 Royal Bank Bldg. Est. **$40,000.**

Ont., Toronto—PLANT—T. J. Ferguson, engr., 297 Victoria St., plant and services at foot of Parliament St., at Fleet St. E., for Sunsoy Products, Ltd., 468 Queen St. E., to Pigott Constr. Co. Ltd., Pigott Bldg., Hamilton, about **$425,000.** CD 11/22—ENR 11/25.

Ont., Welland—FACTORY—Electro-Metallurgical Co. of Canada, Ltd., Crowland Twp., Welland, 1 story, 31x50x172 ft., rein.-con. factory, to Gardner Const. Co. Ltd., 7 Riverbank St., **$80,000.**

Que., Hull—PLANT—Mica Co. of Canada, Ltd., 2 Loise St., plant addn., to E. Brunet & Sons, 7 Alymer Rd. $40,000. Richards & Abra, 55 Metcalfe St., Ottawa, Ont., archt.

Que., Montreal East (Postal Dist. Montreal)—PLANTS—Canadian Copper Refiners Ltd., 14 Durocher St., selenium products plant and power plant addn., to Foundation Co. of Canada Co. Ltd., 1538 W. Sherbrooke St., Montreal. Est. **$50,000** and **$64,000** respectively. CD 12/15 and 11/9 respectively—ENR 11/11.

Que., St. Johns—PLANT—Singer Mfg. Co., Ltd., 165 St. Paul St., 1 story, bsmnt., 50x60 ft., rein.-con. plant exten., to J. P. Trahan, 178 Mercid St. Est. **$40,000.** Archambault & Roy, 6278 First Ave., Montreal, engrs. CD 12/14—ENR 12/16.

Proposal Advertisements see p. 113

Postwar Projects see p. 90

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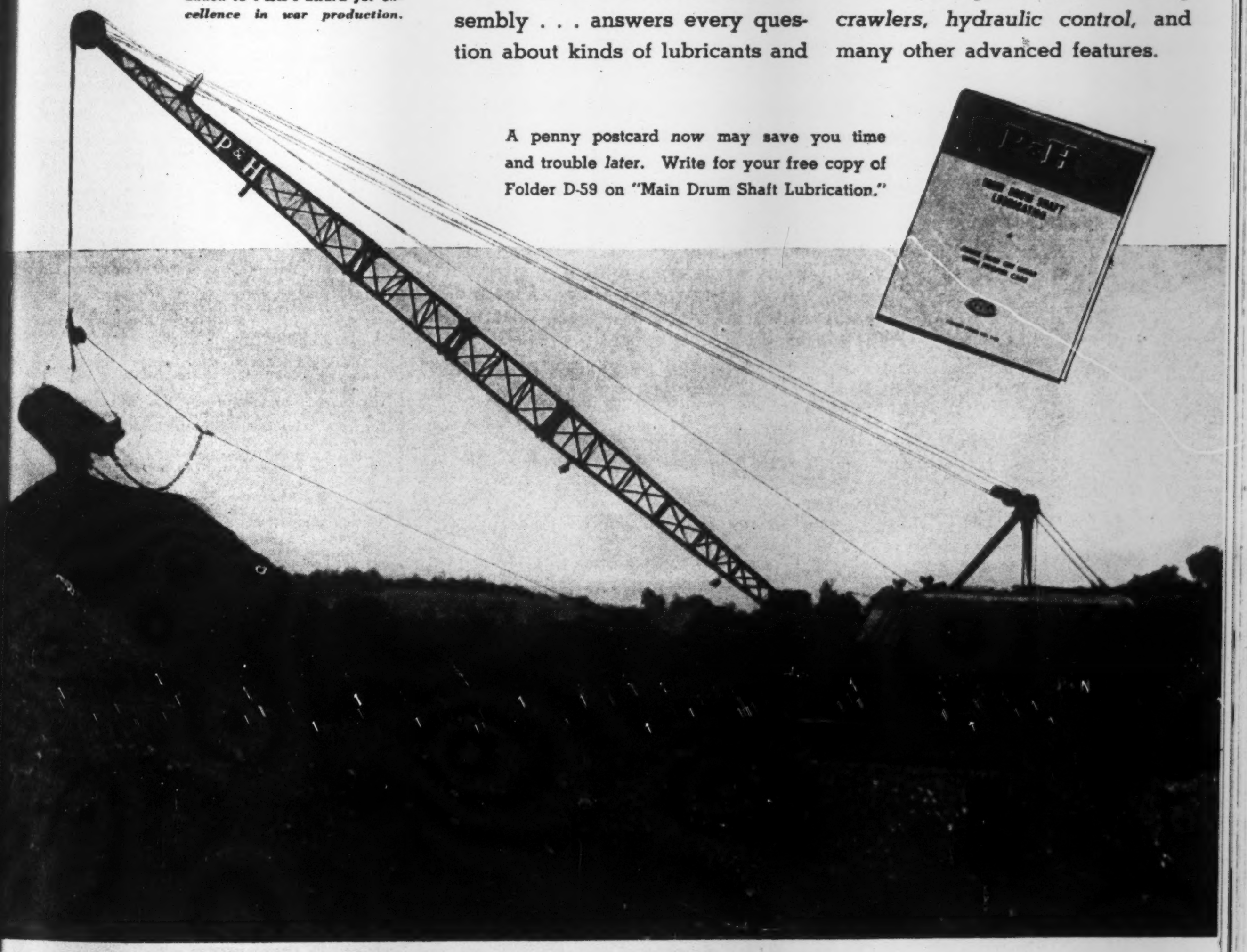

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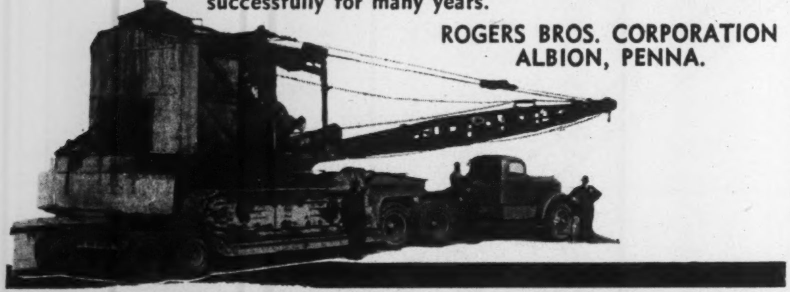

POSTWAR PROJECTS (Cont'd.)

W'ly., $21,000; Mound Ave. from Independence E'ly., $40,000; Sideway St., $[illegible]; W. 25 St., Franklin to Clark Aves., $[illegible]; W. 48 St., $66,000; plans partially completed watermain exten., Brookpark to [illegible] Rds., $210,000; reservoir, Chardon Rd., vicinity of Chardon and Rockefeller Aves., $275,000; Warrensville reservoir, Warrensville Rd., east of Green Rd., $1,057,500; Crib No. 3, steel plate reinforcing, $75,000; Harvard Ave. connection, Warrensville Rd., across Golf Course to reservoir, $240,000; Nottingham Clear Water reservoir and temporary pump station, $655,000; plans not yet started cutting in cross connection at 20 critical points, $30,000; elevated tank and 12 in. watermain near Blossom Hill, $62,000; elevated tank, Strongsville, $50,000; new automatic equipment, Woodland Yards, $200,000; three hundred 6 in. hydrants replacing 4 in. hydrants, $120,000. City for Div. of Water and Heat.

O., Conneaut—Elevated water storage tank. $150,000. W. V. Kantola, city engr.

O., Euclid (br. Cleveland)—Watermains. $250,000. F. A. Thomas, city engr.

O., Girard—Water reservoir, filtration plant imprvs., watermain extens. Over $15,000. B. D. Church, city engr.

SEWERS & WASTE DISPOSAL

Ia., Des Moines—A. Johnson, city clk., City Hall, enlarging sewage treatment plant, incl. digesters addn.

Ia., Lake View—Catherine Monroe, city clk., City Hall, sewer construction. $26,400.

★**Minn., Rochester**—Sewage disposal plant. $600,000. Pillsbury Engineering Co., 1200 2 Ave. S., Minneapolis, engr. CD 6/10—ENR 6/17.

★**N. J., Newark**—City, City Hall, intercepting trunk sewer. $1,650,000. D. Coles, City Hall Annex, acting engr.

★**N. Y., Batavia**—City, sewerage sys., disposal plant. $751,000. State Planning Aid funds allocated.

N. Y., Bronxville—Village, drainage imprvs. $40,000. State Planning Aid funds allocated.

N. Y., Croton on Hudson—Village, sewage disposal plant. $70,000. State Planning Aid funds allocated.

N. Y., Fredonia—Village, sanitary sewers, trunk lines, $125,000; storm sewers. $25,000. State Planning Aid funds allocated. CD 8/6—ENR 8/12.

N. Y., Gloversville—City, addnl. sewage disposal plant. $150,000; outfall sewer, $100,000. State Planning Aid funds allocated.

N. Y., Johnstown—City, sewers, sewage treatment plant. $308,000. State Planning Aid funds allocated.

N. Y., Larchmont—Village, making plans widening Pine Brook storm drain, $450,000. State Planning Aid funds allocated. A. Richards, village engr. CD 12/15.

N. Y., Little Falls—City, sewage disposal plant, incinerator. $200,000. State Planning Aid funds allocated.

N. Y., Lockport—City, exten. trunk sewerage sys. $300,000. State Planning Aid funds allocated.

★**N. Y., Ogdensburg**—City, sewage disposal plant. $500,000; interconnection of sewer outlets, $150,000. State Planning Aid funds allocated.

N. Y., Port Chester—Village, storm water drainage connection. $80,600. State Planning Aid funds allocated.

N. Y., Sherburne—Village, sewerage sys., disposal plant. $110,000. State Planning Aid funds allocated.

★**O., Akron**—City, City Hall, sewers. $1,250,000; sewage treatment plant. $1,000,000. L. B. Heibel, City Hall, city engr.

★**O., Ashtabula**—City, sewers and grade separation construction, $615,851. C. R. Stanhope, city engr.

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CONSTRUCTION TRENDS

Notes on significant movements in the construction industry

Postwar Earthwork and Drainage Construction

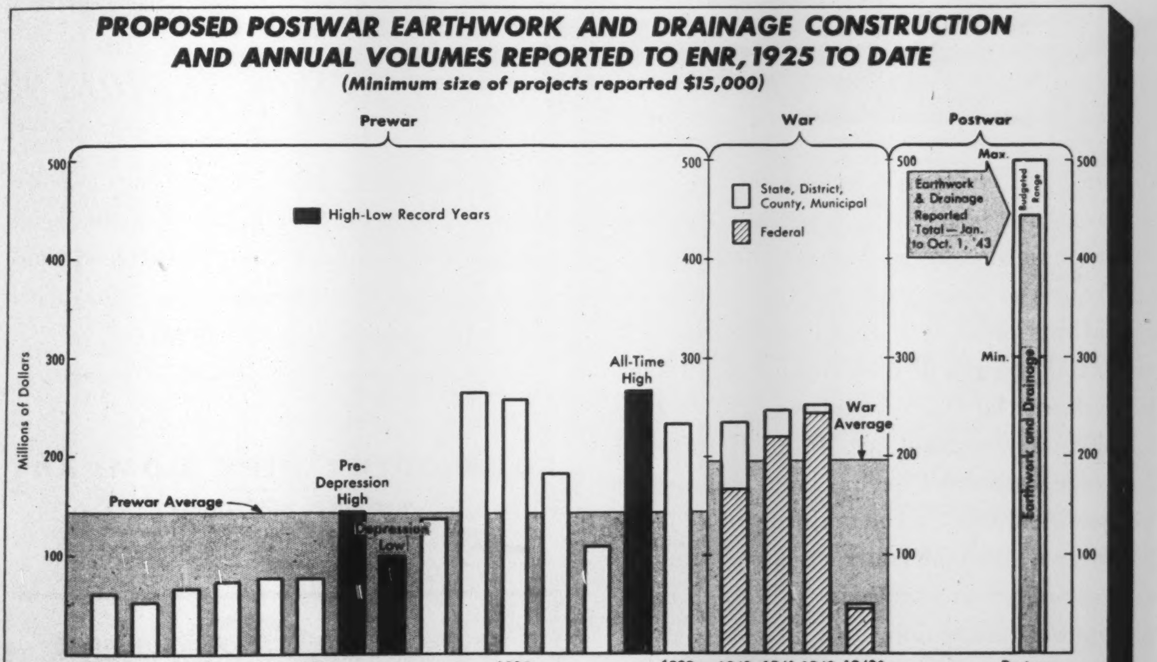
EARTHWORK AND DRAINAGE projects—dams, flood control, irrigation, waterways—proposed during the first nine months of 1943, for postwar construction, total $443,805,000. This is 12.8 percent of the $3,476,987,000 postwar project volume for all types of civil engineering construction reported for that period to *Engineering News-Record*.

The postwar budget for earthwork and drainage construction, based on an assumed national income of $150,000,000,000 per year, is estimated at $300,000,000 to $500,000,000 per year by *ENR*.

Thus, with the $443,805,000 already reported in the identified-projects backlog, the *minimum* annual volume budgeted for earthwork and drainage has been exceeded by 48 percent, and 89 percent of the *maximum* budgeted figure has entered the proposed work stage in the nine months since the first of the year.

The West of the Mississippi states report $161,827,000 in proposed earthwork and drainage projects, 36.5 percent of the nation's postwar earthwork and drainage volume for the nine months. Middle Atlantic states total, $116,485,000, is 26.2 percent of the postwar figure; Middle West states, $55,889,000, 12.6 percent; Far West states, $43,781,000, 9.9 percent; New England states, $43,686,000, 9.8 percent; and the Southern states, $22,137,000, or 5 percent.

New postwar earthwork and drainage project reports are coming in continuously and this class of construction promises to be the first to go over the top of its postwar "budget." It also would seem very probable that postwar volume will exceed the all-time high year of $268,000,000 in 1938.



PROPOSED POSTWAR EARTHWORK AND DRAINAGE CONSTRUCTION AND ANNUAL VOLUMES REPORTED TO ENR, 1925 TO DATE

(Minimum size of projects reported $15,000)

ENGINEERING NEWS-RECORD. Published every Thursday. **Return postage guaranteed.** Vol. 131, No. 27. Price 25c per copy. Allow at least ten days for change of address. All communications about subscriptions should be addressed to the Director of Circulation, 99-129 N. Broadway, Albany, 1, N. Y., or 330 W. 42nd Street, New York, 18, N. Y. Subscriptions, United States, U. S. Possessions and Latin American Republics, $5.00 for one year, $8.00 for two years, $10.00 for three years. Canada, $5.50 for one year, $9.00 for two years, $11.00 for three years. Great Britain and British Possessions 54 shillings for one year, 108 shillings for three years. All other countries, $9.00 for one year, $18.00 for three years. Entered as second-class matter October 29, 1936, at the Post Office at Albany, N. Y., under the Act of March 3, 1879. Printed in the U.S.A. Cable Address: "McGrawhill New York." Member A.P.B. Member A.B.C. Copyright 1943 by McGraw-Hill Publishing Company, Inc. James H. McGraw, Founder and Honorary Chairman; James H. McGraw, Jr., President; Howard Ehrlich, Executive Vice-President; Mason Britton, Vice-President; Curtis W. McGraw, Treasurer; Joseph A. Gerardi, Secretary; J. E. Blackburn, Jr., Circulation Manager. **Publication office: 99-129 North Broadway, Albany, 1, N. Y. Editorial and Executive Offices: 330 West 42nd St., New York, 18.** District Managers and Branch Offices: Fred G. Hudson, 520 N. Michigan Ave., Chicago, 11; J. W. Otterson, 68 Post St., San Francisco, 4; Aldwych House, Aldwych, London, W. C. 2, England; Washington; J. M. Spackman, New York; A. B. Cozzens, Philadelphia; E. E. Duff, Jr., Cleveland; B. F. Horn, Detroit; Richard Y. Fuller, St. Louis; R. N. Phelan, Los Angeles; J. I. Ballard, Boston; Ralph Maultsby, Atlanta, Ga.

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Plan today... for your pipelines of tomorrow

Leading water works engineers are now preparing for peace with complete, detailed plans for new municipal supply lines. Judging from the blue-prints of the future, all indications point to a rapid residential and industrial growth of many cities and towns throughout the United States.

For many years Lock Joint Reinforced Concrete Pressure Pipe has been included in the specifications for the majority of all large diameter water pipe contracts and is playing an ever-increasing role in principal cities throughout the nation.

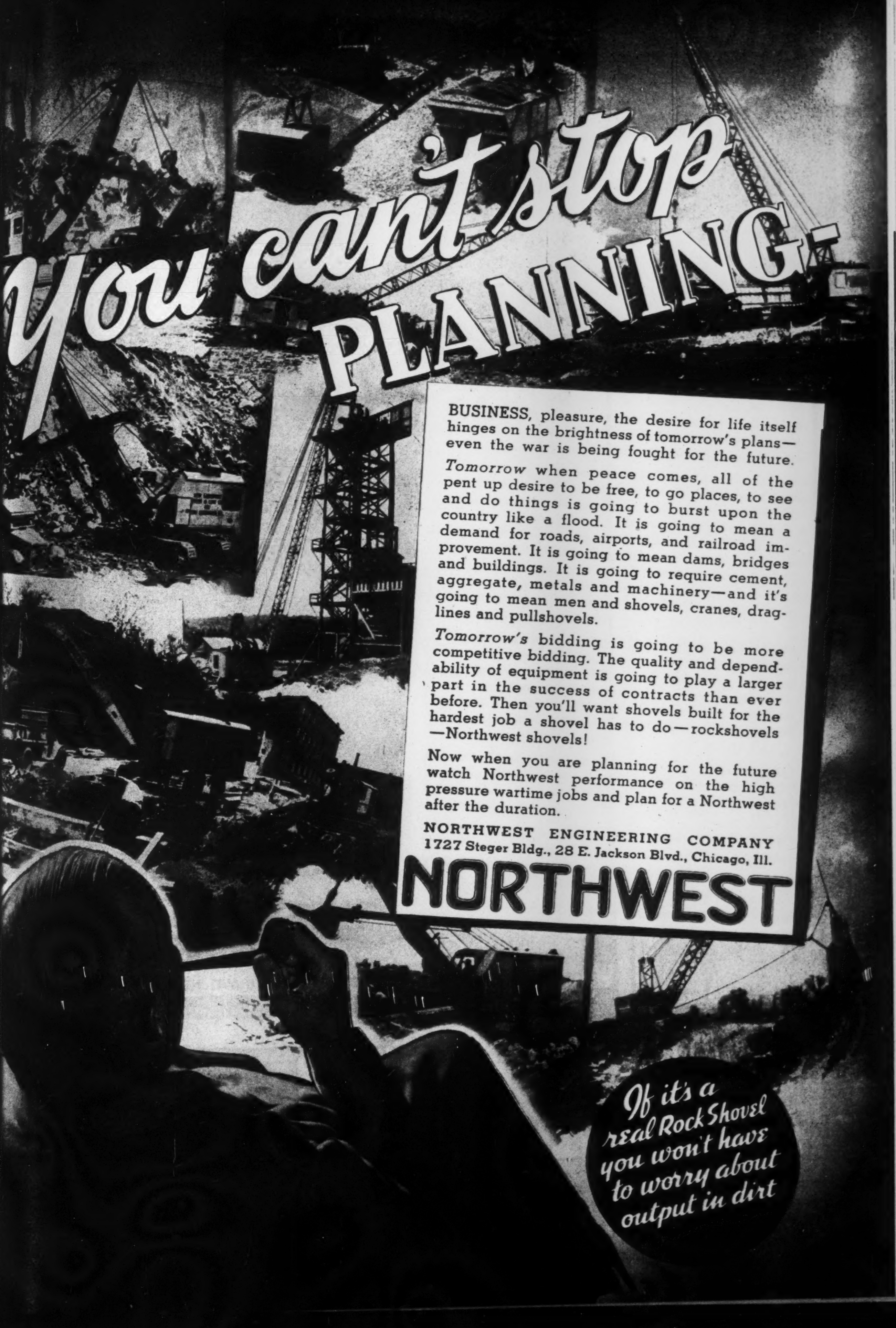
"Tailor-made" to fit the job, there is absolute assurance that strong, sturdy Lock Joint Pipelines are permanently immune to tuberculation and corrosion. City officials can depend upon permanent high carrying capacity and low cost operation for a century of useful service. Look to Lock Joint Reinforced Concrete Pressure Pipe as your most economical and safest post-war investment.

Whether your project is large or small, for the present or the future, your 'phone call, telegram, cable or letter to any of our offices will bring a prompt reply.

LOCK JOINT PIPE COMPANY
Established 1905
AMPERE, NEW JERSEY
Denver, Colo. • Chicago, Ill. • Kenilworth, N. J. • Kansas City, Mo. • Rock Island, Ill. • Joplin, Mo. • Valley Park, Mo. Cleveland, Ohio • Hartford, Conn. • Navarre, Ohio

LOC NT
Reinfo
PRESS PIPE

SCOPE OF SERVICES *Lock Joint Pipe Company specializes in the manufacture and installation of Reinforced Concrete Pressure Pipe for Water Supply Mains as well as Concrete Pipe of all types for Sanitary Sewers, Storm Drains, Culverts and Subaqueous lines.*



You can't stop PLANNING-

BUSINESS, pleasure, the desire for life itself hinges on the brightness of tomorrow's plans—even the war is being fought for the future.

Tomorrow when peace comes, all of the pent up desire to be free, to go places, to see and do things is going to burst upon the country like a flood. It is going to mean a demand for roads, airports, and railroad improvement. It is going to mean dams, bridges and buildings. It is going to require cement, aggregate, metals and machinery—and it's going to mean men and shovels, cranes, draglines and pullshovels.

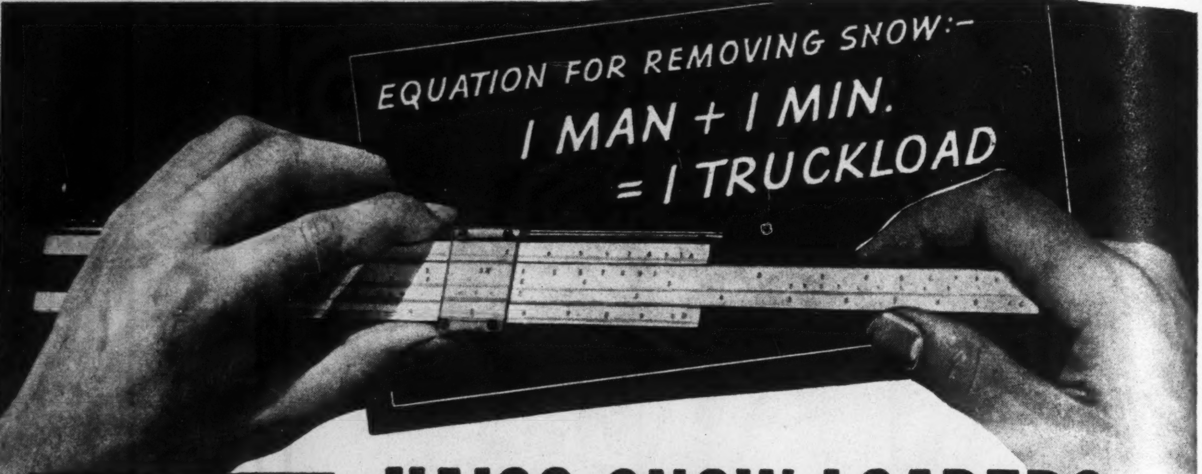
Tomorrow's bidding is going to be more competitive bidding. The quality and dependability of equipment is going to play a larger part in the success of contracts than ever before. Then you'll want shovels built for the hardest job a shovel has to do—rockshovels—Northwest shovels!

Now when you are planning for the future watch Northwest performance on the high pressure wartime jobs and plan for a Northwest after the duration.

NORTHWEST ENGINEERING COMPANY
1727 Steger Bldg., 28 E. Jackson Blvd., Chicago, Ill.

NORTHWEST

If it's a real Rock Shovel you won't have to worry about output in dirt



HAISS SNOW LOADERS

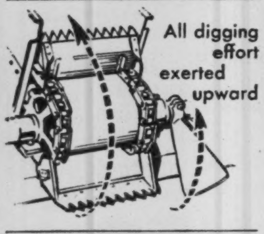
The Haiss Snow Loader, simple to operate and rugged in design, will tackle city snow removal at a rate exceeding 10 cu. yds. per minute. Leaving behind it a clean 9-ft. path, the Haiss Loader will pick up a windrow—plowed snow pile—wet, dry or frozen. The powerful functional design is distinctively "Haiss"—and worthy of special investigation.

Where priorities are available, the Haiss Snow Loader is the modern answer to snow-loading problems . . . Write for Catalog

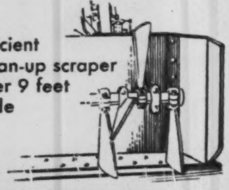
EXCEPTIONAL ENGINEERING ADVANTAGES

Revolving propellors cut into hard-frozen snow piles

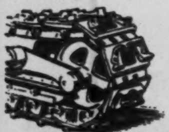
Sturdy tooth-edged flights of scoop shape



All digging effort exerted upward



Efficient clean-up scraper over 9 feet wide



Non-clog creeper treads with sure-grip grousers

GEORGE HAISS MFG. CO., INC., 140th ST. & RIDER AVE., NEW YORK 51, N.Y.

HAISS

A factory man lives on his feet

THAT'S WHY PRODUCTION WORKERS PREFER THIS FLOOR

● To a greater degree than ever before armies today roll along on wheels, but the men in war production plants live on their *feet.*

A worker who spends his life in a shop prefers a floor that is resilient and easy to walk on. Thousands of industrial leaders, in busy war production plants, know that a comfortable working surface steps up employee morale as well as factory efficiency.

Tough end-grain Kreolite Wood Block Floors, highly resistant to weight, abrasion impact and wear, provide a warm, comfortable, turf-like surface to work on or walk over. They cushion the feet, also protect dropped tools.

They absorb nerve-wracking noise and vibration, protect eyes from glare, provide low tractive resistance and a firm skid-proof footing, in every way reducing industrial fatigue, promoting worker's health, conserving productive energy. Easy to install, easy to replace, by units or in sections, with least disturbance to operations. Kreolite Wood Block, with exclusive Kreolite JENNITE finish, is today the preferred floor replacement material for war-time plant maintenance.

Write or wire and a Kreolite flooring engineer from our nearest office will call upon you without obligation.

THE JENNISON-WRIGHT CORPORATION
TOLEDO, OHIO • *23 Nation-Wide Offices*

Specify **KREOLITE...**

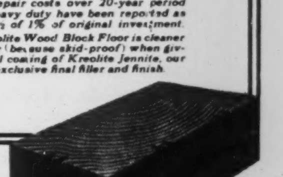
accept no substitute

HOW WOOD BLOCKS SPEED WAR PRODUCTION

1 Quick to Install—Use Immediately After Laying
2 Easy to Replace in Sections—or by Units
3 Low Maintenance Cost*
4 Low Tractive Resistance—Easy to Truck Over
5 Comfortable to Work Over
6 Dustless—Protect Bearings and Finished Product
7 Absorb Noise—Quiet
8 Lessen Vibration—Composed of Many Units
9 Resilient—Protect Dropped Tools and Parts
10 Insulate Against Heat and Cold
11 Spark-proof—Skid-proof—Safe**
12 Firm Foundation for Machines
13 Durable—Withstand Heavy Abuse
14 Easy to Provide for Conduits or Cables
15 No Glare from Reflected Light—No Eye Strain Causing Increased Fatigue and Poor Work

**Total repair costs over 20-year period under heavy duty have been reported as low as ½ of 1% of original investment.*

***A Kreolite Wood Block Floor is cleaner and safer (because skid-proof) when given a final coating of Kreolite Jennite, our new exclusive final filler and finish.*

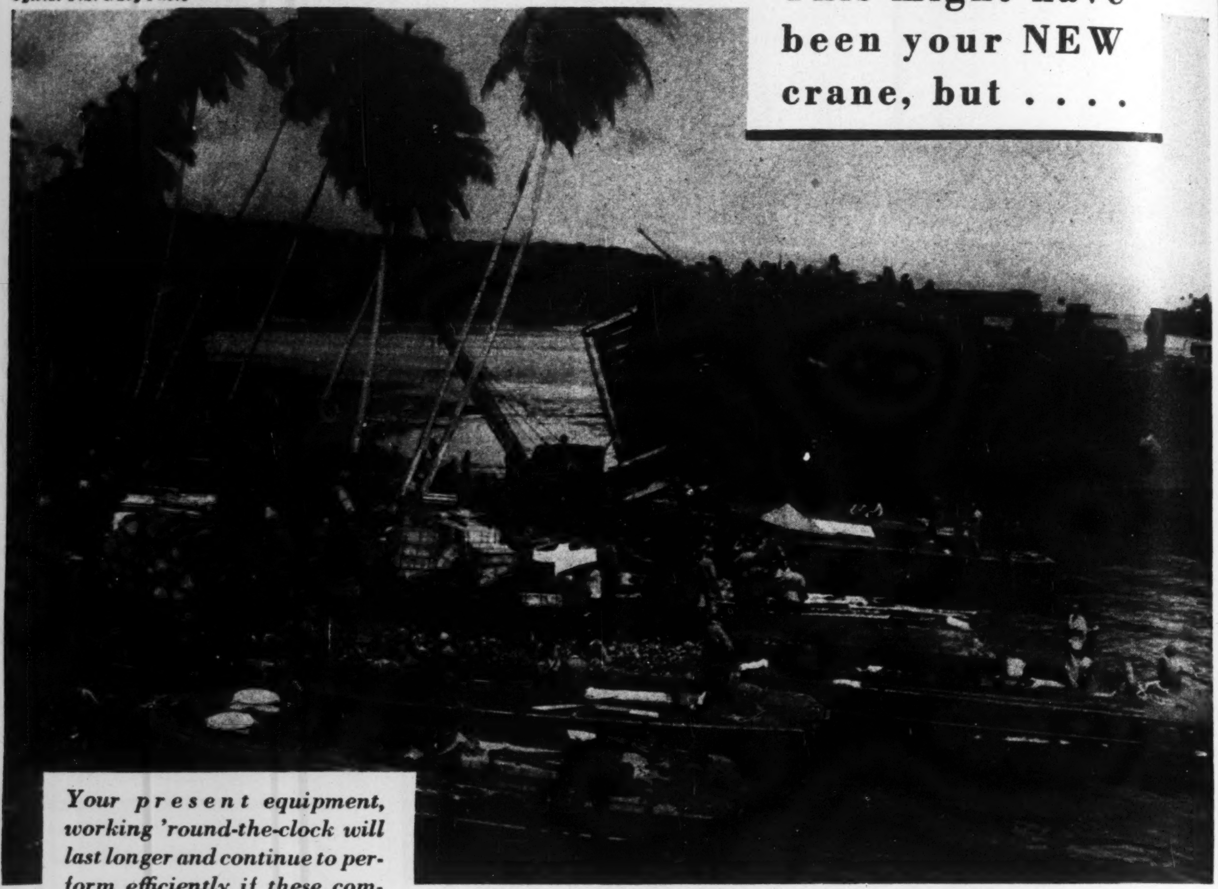


KREOLITE WOOD BLOCK FLOORS

LESS FATIGUE, MORE PRODUCTION

KREOLITE RAILROAD SWITCH & INDUSTRIAL TRACK TIES • PILING • BRIDGE & DOCK LUMBER

This might have been your NEW crane, but . . . .



Official U.S. Navy Photo

Your present equipment, working 'round-the-clock will last longer and continue to perform efficiently if these common-sense rules are followed:

- insure proper regular lubrication
- provide daily inspection to detect troubles while they are still small
- make adjustments when needed — don't wait
- tighten loose bolts and nuts
- keep fuel, lubricants and water clean
- remove clutch and brake bands and clean lining with good grade of clear gasoline
- change cables end-for-end to increase life of wire rope
- plan work to favor machine
- inspect engine regularly — flush radiator when dirty
- always give model and serial numbers when ordering repairs
- contact your BAY CITY distributor for parts and service.

here again BAY CITY helps keep the supply lines moving at Rendova

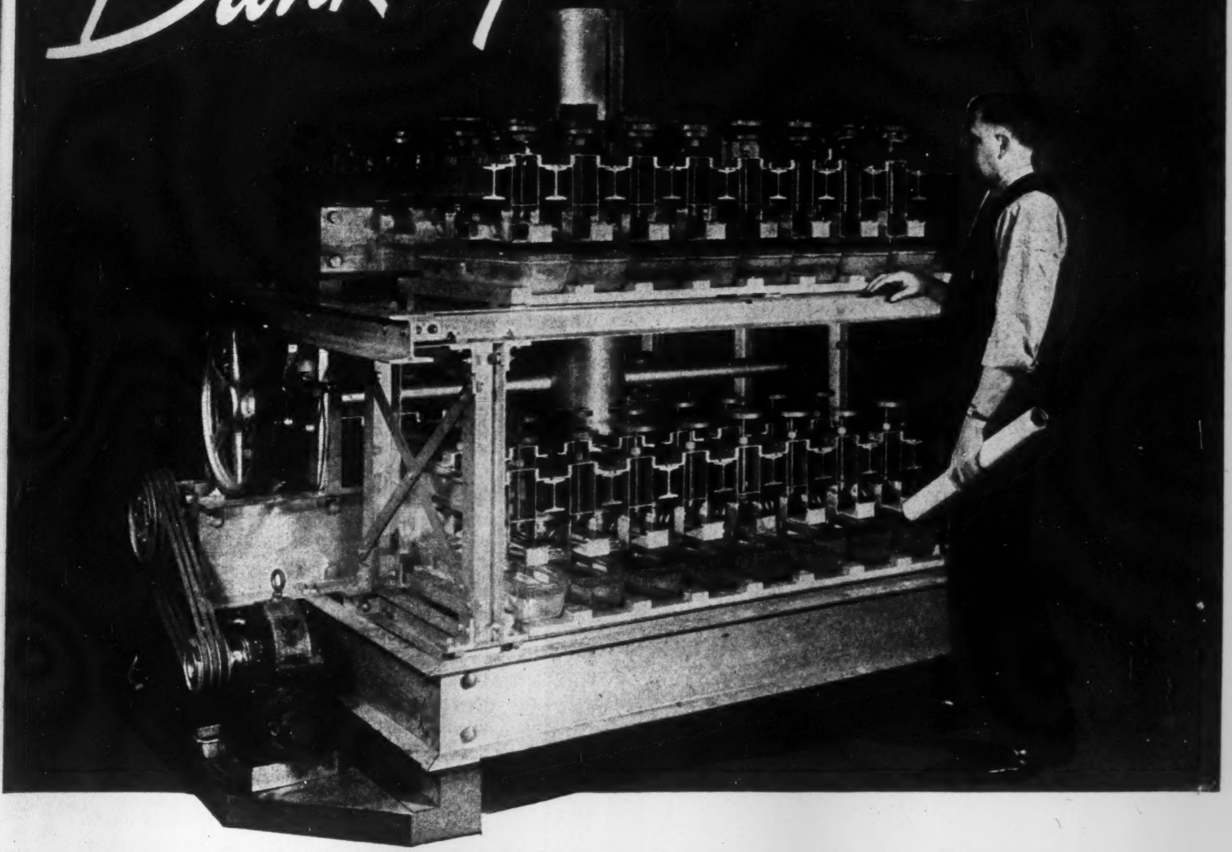
Wherever the bow doors of an LST swing wide to emit a flow of supplies to support a new advance against the enemy, you will usually find modern excavating and material handling equipment speeding the job. Here at Rendova Island, a BAY CITY convertible crane helps prepare the way for the capture of nearby Munda. Your new equipment has gone to war — let your dollars follow by investing in War Bonds. Yes, every Bond you buy now can be ear-marked for new equipment to take care of your post-war needs. BAY CITY shovels, cranes and draglines will be available with both crawler and pneumatic tire mounting. Why not write for catalogs so you will have them when needed? BAY CITY SHOVELS, Inc., Bay City, Mich.

BAY CITY SHOVELS
12 Sizes
⅜ to 1½ Yard
Also truck mounted
shovels and cranes

BAY CITY

SHOVELS • CRANES • DRAGLINES • TRENCH-HOES • SKIMMERS

Dunking makes a tough test



. . . but apparatus like this proves Alcoa Aluminum Alloys before you put them to work

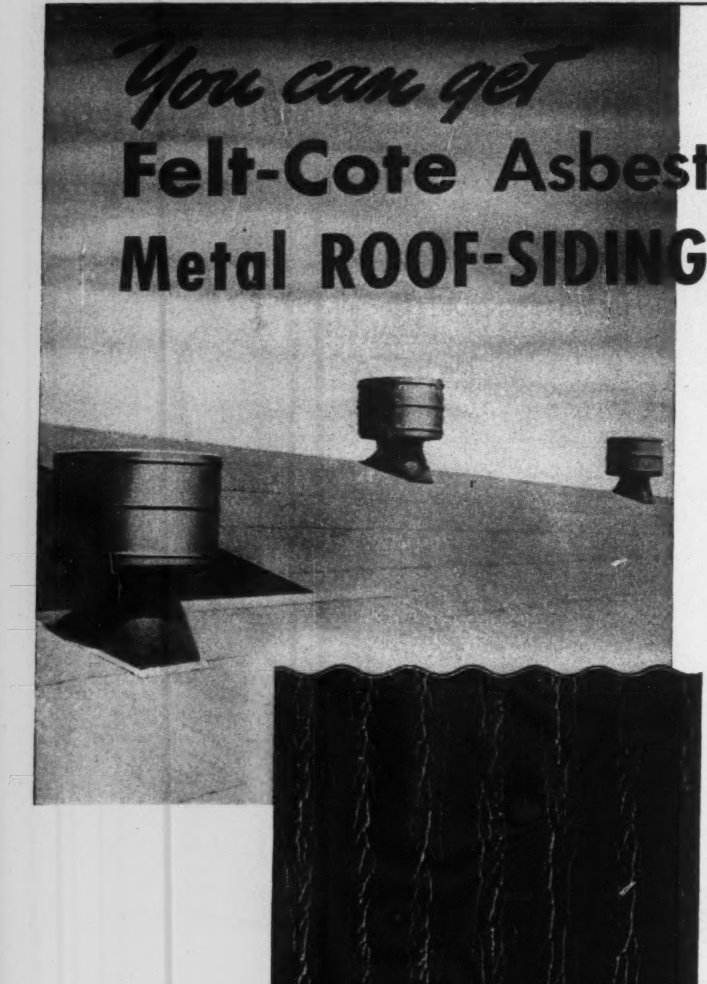
Suppose you were planning equipment that was to be wet by a liquid some of the time. You'd want to be sure the construction material you selected could stand up under such treatment. Well, here's a machine, in constant use at Aluminum Research Laboratories, which does this kind of testing.

Dozens of samples are tested simultaneously; different alloys in various forms, extrusions, castings, rolled shapes and sheet. Stressed and unstressed pieces are placed side by side. At regular intervals, the machine "dunks" them into the liquids to be encountered in service, then pulls them out. A housing (not shown here) around the machine makes it possible to keep atmospheres at temperatures and humidities simulating service conditions.

Day after day this test goes on, until we can say—"There's the Alcoa Aluminum Alloy best suited to your job."

This pre-testing, like dozens of other similar services available to Alcoa's customers, helps account for the better performance of Alcoa Aluminum when it gets on a job. It's another reason why those postwar specifications you're writing should read, "ALCOA ALUMINUM". Aluminum Company of America, 2151 Gulf Building, Pittsburgh, Pa.

ALCOA ALUMINUM



A PRODUCT OF THE AMERICAN STEEL BAND COMPANY

You can get

Felt-Cote Asbestos-Protected Metal ROOF-SIDING-VENTILATORS

Now!

PRODUCTION FACILITIES, organization, and available supplies are such that the American Steel Band Company can offer you speedy delivery and prompt installation of needed Roofing, Siding, or Ventilators.

GOVERNMENT SANCTION clears the way for turning out such material without formality or restriction for any approved user Repairs and maintenance jobs need no "priority" rating Certain classes of building have blanket approval even for new work. Others are subject to permissive ruling—much more favorable than some have supposed.

INVESTMENT in such protective or constructive benefits to a property is evidently sound where deterioration would in any case make it necessary before long, or where efficiency suffers for want of modern equipment.

SURPLUS EARNINGS from current operation can not, as a rule, be kept in reserve against future needs of the business. Rather, since no justifiable use has been found for them, they will be taxed as "excess" and will no longer be at the disposal of management. As much as 80% of your roofing or ventilator job may be covered by such earnings if action is taken now

LET US DISCUSS your requirement. Learn about the long life, insulating value, and other advantages of FELT-COTE. Mail us rough drawings and necessary specifications, and we will submit estimates, with full details. If desired, we will send a representative. Any inquiry will have immediate attention.

merican Steel Band Co.

PITTSBURGH, PA.

stablished 1891 **Plant, Carnegie, Pa.**

ROOFING · SIDING · VENTILATORS · LOUVERS · DUCTS · METAL SPECIALTIES

Reynolds Metal Company Aluminum Plant, Listerhill, Alabama

CONCRETE "ALLOY"...

LIKE the aluminum alloy pigs shown above, the Pozzolith Concrete used in building this great plant is a prominent example of modern technologic progress.

Just as the properties of this aluminum were brought up to rigid aircraft standards by adding certain elements (producing an aluminum alloy), the construction requirements of this plant were met by "alloying" the concrete with Pozzolith, Cement Dispersion.

In hundreds of projects, including the following list of aluminum plants, concrete "alloy"— Pozzolith Concrete — has helped meet the construction requirements of speed, economy, durability.

REYNOLDS METALS COMPANY
ALUMINUM COMPANY OF AMERICA — (10 Plants)
ALUMINUM COMPANY OF CANADA, LTD.—(6 Plants)
ALUMINUM FORGINGS, INC.
FAIRMOUNT ALUMINUM COMPANY
NATIONAL ALUMINUM CYLINDER HEAD CO.

Find out how Pozzolith, Cement Dispersion*, in addition to its other benefits, improves workability even though water-cement ratio is substantially reduced. Write or wire for complete information.

THE MASTER BUILDERS COMPANY, LTD.

TORONTO In the U. S. A.: The Master Builders Company, Cleveland, Ohio **MONTREAL**

**Other Master Builders Products employing Cement Dispersion which are serving the Construction Industry to produce faster, better, more economical results: MASTERPLATE for heavy duty floors; EMBECO for non-shrink concrete grouts and repairs; OMICRON MORTARPROOFING for masonry mortars.*

MASTER BUILDERS

When you build homes again you'll want SKILSAW

TO SPEED UP ALL THESE JOBS!

METAL CUTTING

• With Friction Blades, SKILSAW quickly cuts flat or corrugated metals for roofs or siding . . . formed decorative bars for store fronts . . . stainless steel, brass, lead and iron.

GROOVING

• With a special Grooving Blade, SKILSAW grooves for stairs, shelves, and weather-stripping . . . slots floors for sliding doors . . . speeds up rabbeting, mortising and many other jobs.

Smart builders are planning *now* for the day Peace comes and the rush for new homes is on. They're figuring just how SKILSAW will save hours and dollars on countless cutting jobs in addition to the regular lumber sawing they've always preferred it for. They know that when SKILSAW gives them *extra* savings through *extra* use, they'll get more jobs at lower, more profitable bids!

Start learning now about all the different operations you can speed up with SKILSAW. Ask for a demonstration of how fast SKILSAW cuts flat or corrugated metals . . . grooves and bevels . . . cuts stone, tile, concrete and compositions. Phone your distributor *today*.

CUTTING CONCRETE

• With Abrasive Discs, SKILSAW swiftly sizes concrete blocks and limestone sills . . . cuts slate, brick and Terra Cotta . . . saws Asbestos Cement sheets for walls and sidings.

SKILSAW, INC.
4771 Winnemac Ave., Chicago, 30, Ill.
Sales and Service Branches in All Principal Cities

SKILSAW PORTABLE ELECTRIC TOOLS

★ *MAKE AMERICA'S HANDS MORE PRODUCTIVE* ★

A SOCK ON THE NOSE!

Is it your problem to provide adequate airport drainage under shallow cover? If so, here's a ready answer. Flexible ARMCO Corrugated Pipe (plain or perforated) has proved ability to resist crushing, cracking or disjointing under the impact and weight of heavy loads.

This means freedom from failure. You have continued assurance of a firm, dry field with uniform support for runways or direct wheel loads. Operations are safer and practicable the year around. Even the effects of a heavy storm are but short-lasting.

ARMCO Pipe is also shatterproof — an important point in case the field becomes a military objective. Unskilled labor can easily make the installation, using long lengths joined together with sturdy band couplers. Shifting soils and severe frost action are no hazards.

Consider ARMCO Corrugated Pipe when you are planning or building essential war-time airports. Be sure to ask your local ARMCO man to show you the Manual of Airport Drainage. Or write to us direct regarding specific problems. Armco Drainage Products Assn., Middletown, O.

ARMCO ARMCO **CORRUGATED PIPE**

LET "Assistant Cables" CARRY PART OF THE LOAD

If your insulated power cables are loaded to their limit and there is a demand for more service, you must do something about it. In times like these your decision what to do will be influenced by shortage of materials, military requirements, priorities, and manufacturing restrictions.

You may find that instead of replacing an old cable with a larger one, better results can be obtained by installing an "assistant cable" in parallel with that now in service. If that can be done you will not only keep your old cable in service but you may carry your full load with less copper than would be required for complete replacement of your present cable installation.

To get best results, any cables you buy should be designed by cable engineers to fit the job they are to do and at the same time to get maximum use of the critical materials that go into them. If you need cables for essential work let us tell you more about Simplex cables.

Simplex Wire & Cable Co., 79 Sidney Street, Cambridge 39, Mass.

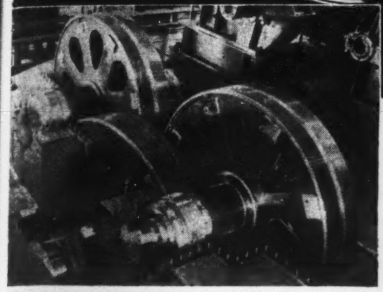
ARMY E NAVY

M

Simplex

WIRES and CABLES

HENDY GEARS PUT THE TEETH IN POWER



Hendy engineers and builds a complete range of special speed reducers and speed increasers.

Small hobbing machine cutting 18.3 inch reduction gears for 300-K.W. turbo-generator. At *right*, assortment of pinions for various geared turbine units.

Hendy gears today are putting the "teeth" in the power that drives the greatest merchant fleet of all time—the American Merchant Marine—over all the oceans of the earth toward inevitable victory.

Soon Hendy gears will be available for rubber mills, paper mills, mines, factories, the countless industrial units that will rebuild the world of tomorrow. From new skill and increased capacity developed in war, Hendy will be able to supply a complete line of gears in all sizes up to 180" diameter and for any power capacity. High load capacity is a requirement of marine gears. Hendy industrial gears measure up fully to the standards set by Hendy marine gears.

JOSHUA HENDY Division

JOSHUA HENDY IRON WORKS

ESTABLISHED 1856

SUNNYVALE, CALIFORNIA

BRANCH OFFICES: Boston · Buffalo · Chicago · Cincinnati · Cleveland · Detroit · New York · Philadelphia · Pittsburgh · San Francisco · St. Louis · Washington · Los Angeles

TURBO-GENERATORS
REDUCTION GEARS
STEAM TURBINES
DIESEL ENGINES

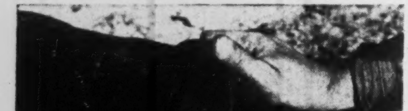
SUSPENSION CROSSING OF WATER (*Official U. S. Army Signal Corps Photo*)

GAS, OIL AND WATER SPEED THROUGH

PIPE LINES TO BATTLE LINES

DEVELOPED BY U. S. ARMY ENGINEERS

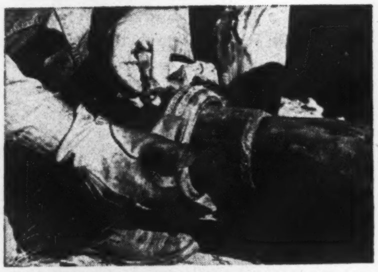
The appetite of an armored tank, a tank destroyer, or a bomber can keep a 1,000 gallon tank truck plenty busy refueling on the battle line. The further the front moves forward away from supply bases, the greater would become the number of refueling units to add to the vehicular traffic congestion.



Synthetic rubber gasketing, to join together two lengths of four-inch pipe—in training operations of engineer petroleum distribution companies. (*Official U.S. Army Signal Corps Photo*)

Long before this problem arose, the U. S. Army Corps of Engineers anticipated it. On the dunes of a desert under burning heat, high up a mountain of the Rockies in mid-winter, and over the roughest country of the Virginian Blue Ridge, Army Engineers strung portable pipe lines developed by the Corps in cooperation with private industry. Up hill, down gulleys, across water, through crotches of trees, around sharp turns, and in extreme heat and extreme cold, the lines were given terrible punishment. "Simulated combat conditions", the Engineers called these tests.

They came up with a pipe line almost as flexible in service as a tank truck. It is light and easily handled. It can stretch 20 miles a day. It can readily be moved to keep pace with swiftly shifting battle lines. Its 20 ft. lengths are easily handled and connected with leak-tight pipe couplings in a matter of minutes. The flexibility of these couplings permits laying the line over rough or smooth terrain.



Tightening Standard Gruvagrip Coupling
(*Official U. S. Army Signal Corps Photo*)

Due to the exacting development and testing by the Corps of Engineers, these portable pipe lines are successfully performing under fire overseas. They are responsible for faster, longer mechanized advances than up till now were possible. We salute the U. S. Army Corps of Engineers! What it has done to revolutionize the war-time transportation of liquid fuels and of water will be felt in the post-war progress of all industry.

G·B
MFG CO

GUSTIN-BACON MFG. CO.

GRUVAGRIP COUPLINGS

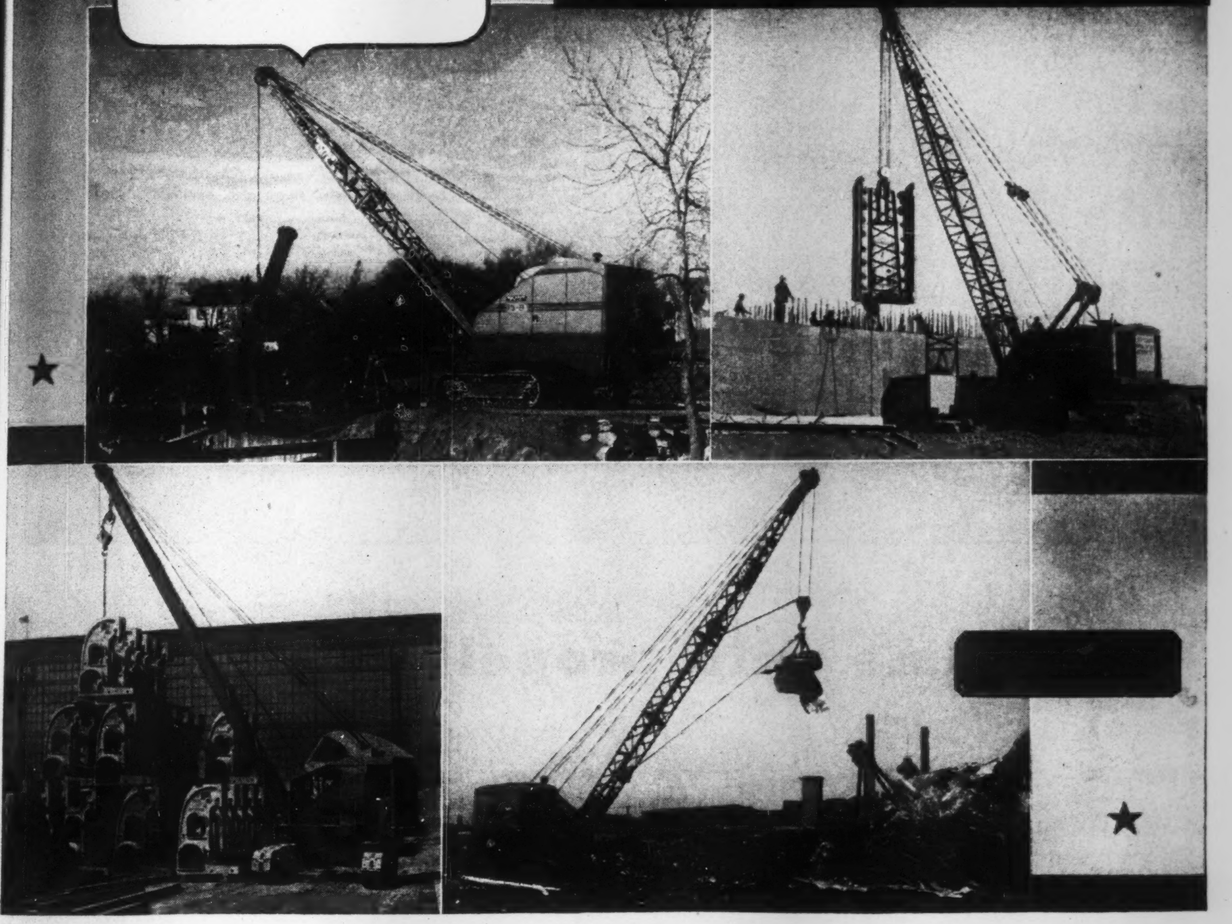
One of the Co-operating Companies

KANSAS CITY 7, MISSOURI

ARMY E NAVY

NEW YORK PHILADELPHIA CHICAGO TULSA HOUSTON SAN FRANCISCO

Wartime construction puts heavy demands on crawler cranes. Here are a few suggestions that may help you keep your rig going at top speed for the duration:

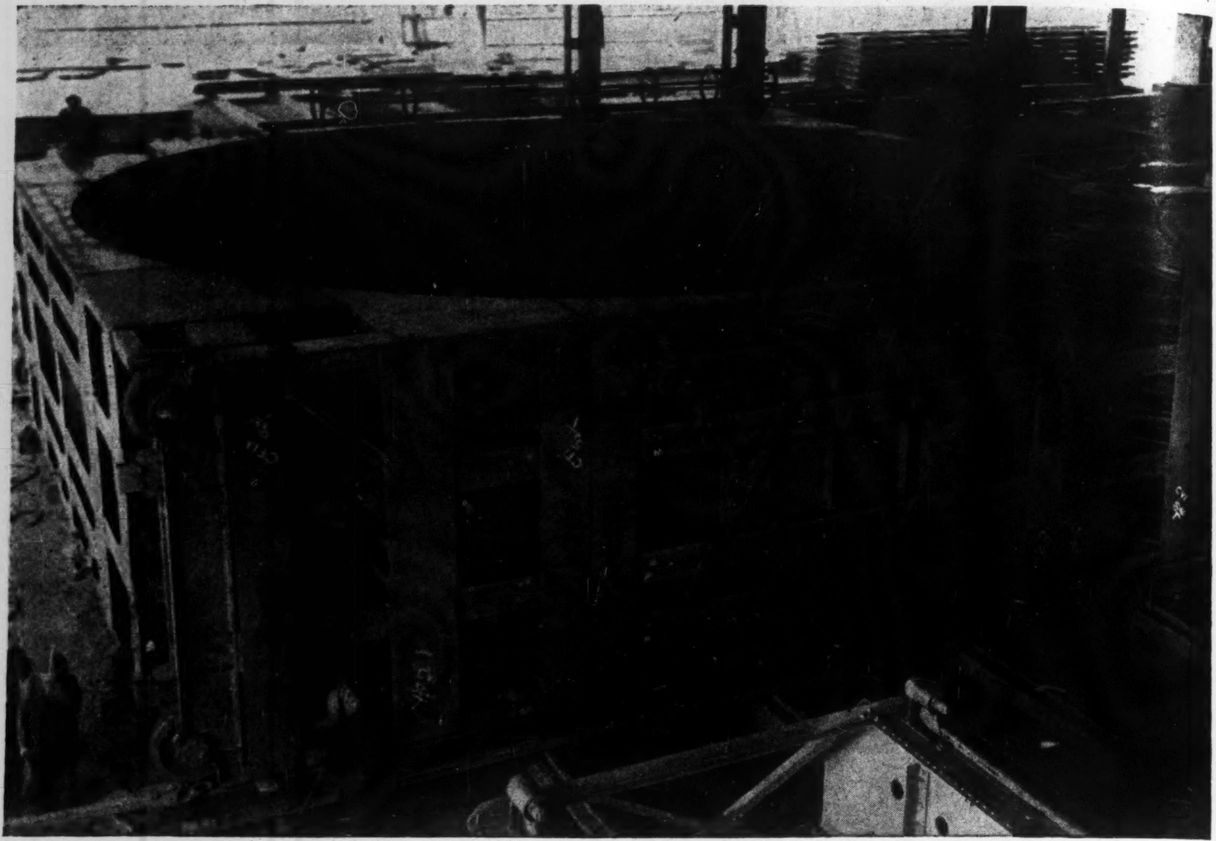


- Keep surface of drum well lubricated for smooth rope spooling.
- Keep brakes and clutches in good adjustment.
- Inspect the entire machine regularly and remedy any troubles while they're still small. Remember to inspect sheaves, watching grooves, guards and lubrication.
- Follow manufacturer's recommendations for lubrication.
- If there are long waits between lifts or moves, shut off engine, never let it idle for long periods.
- Use proper rope length for each job. A too-long rope means excessive overwinding and that increases wear greatly. Rope life can often be increased by reversing ropes end for end.
- Keep close watch for frayed or damaged cables.
- If boom hoist operation is not necessary on particular job, it should be tried and adjusted at regular intervals.
- Call on your distributor for help with special service or maintenance problems.

ARMY E NAVY

Bucyrus-Erie

SOUTH MILWAUKEE, WISCONSIN, U. S. A.



To tame wild propellers

The object shown above is not, as might appear, a big tank or vat. It is a shelter, one of four such 108-ton steel structures fabricated by Bethlehem for the Whiting Corporation, for use at Wright Field, Dayton, Ohio.

Purpose of the shelter (here shown lying on its back) is to house airplane propellers during endurance tests. The shelter measures 42 ft. by 42 ft. by 12 ft., and its 40-foot opening is lined with oak to a depth of 6 in. Mounted on rails (note the wheels on the left), it travels in a tunnel-like concrete structure where, before starting a test, the shelter is clamped in position around the propeller.

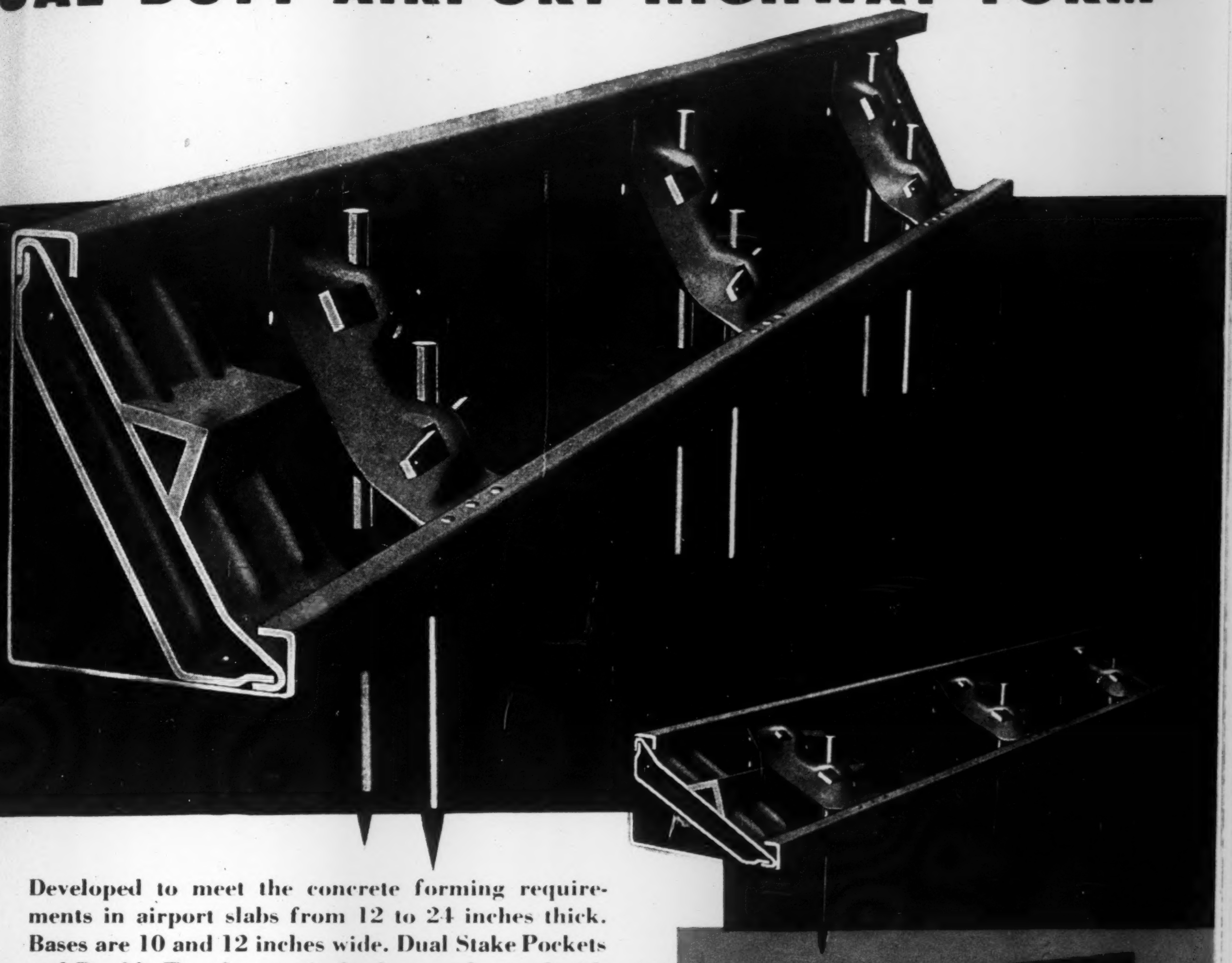
In this snuggery, propellers up to 37 ft. in diameter may be tested. In tests, such untamed monsters, powered by 3300 to 4000 h.p. motors, could be highly dangerous. In case of failure, they might go hurtling all over the Ohio landscape. Hence the housing. Even if it were considerably damaged by whizzing propeller fragments, the shelter would of course be easier to repair or replace than would the surrounding buildings.

Here is a wartime job with a peacetime obligation, and it is the sort of job that Bethlehem's Fabricated Steel Construction Division takes in its stride. Bethlehem has constructed, often in record time, hundreds of acres of facilities to produce the tools of war—tank factories, airplane plants, and shipbuilding ways. The new problems overcome, the experience stored up, in meeting urgent wartime demands for steel construction will be available to help in building more efficiently with steel in the peacetime years ahead.

BUY MORE WAR BONDS

★ ★ ★ **BETHLEHEM STEEL** ★ ★ ★

THE *New* HELTZEL
DUAL DUTY AIRPORT HIGHWAY FORM



Developed to meet the concrete forming requirements in airport slabs from 12 to 24 inches thick. Bases are 10 and 12 inches wide. Dual Stake Pockets and Double Treads permit the form to be used with either dimension for the webb.

Sections are 10 and 15 feet long and provide the means of forming both concrete airport slabs and access roads with a single set of forms.

Another Heltzel VICTORY Development. Ask for bulletin B-19-A.

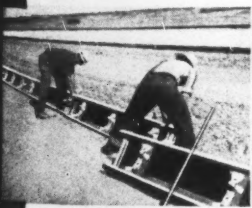


Fig. 1. Setting forms for a 15" concrete airport runway.

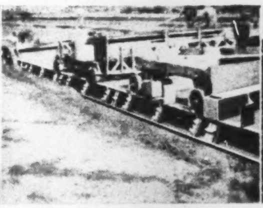


Fig. 2. Finishing a slab 25' wide, 15" thick in one pass.

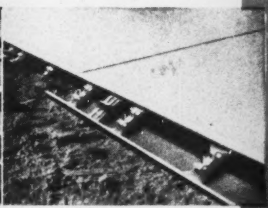


Fig. 3. The same set of forms used with the 10" base as the webb.

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WARREN, OHIO · U. S. A.

HELTZEL SUPERIOR CONCRETE CONSTRUCTION EQUIPMENT

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- AIRPORT FORMS
- DUAL DUTY AIRPORT HIGHWAY FORMS
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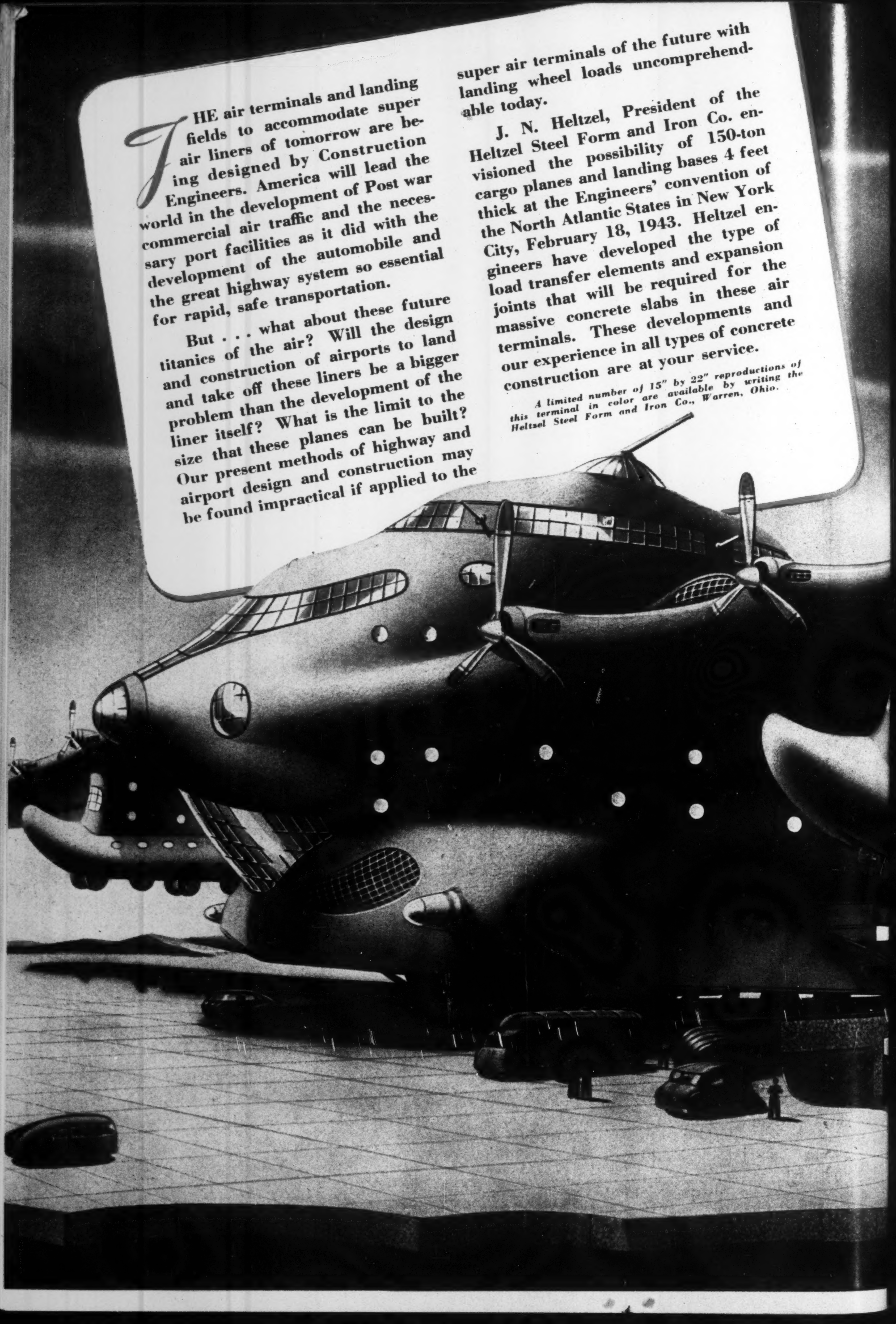
- CONCRETE BUCKETS

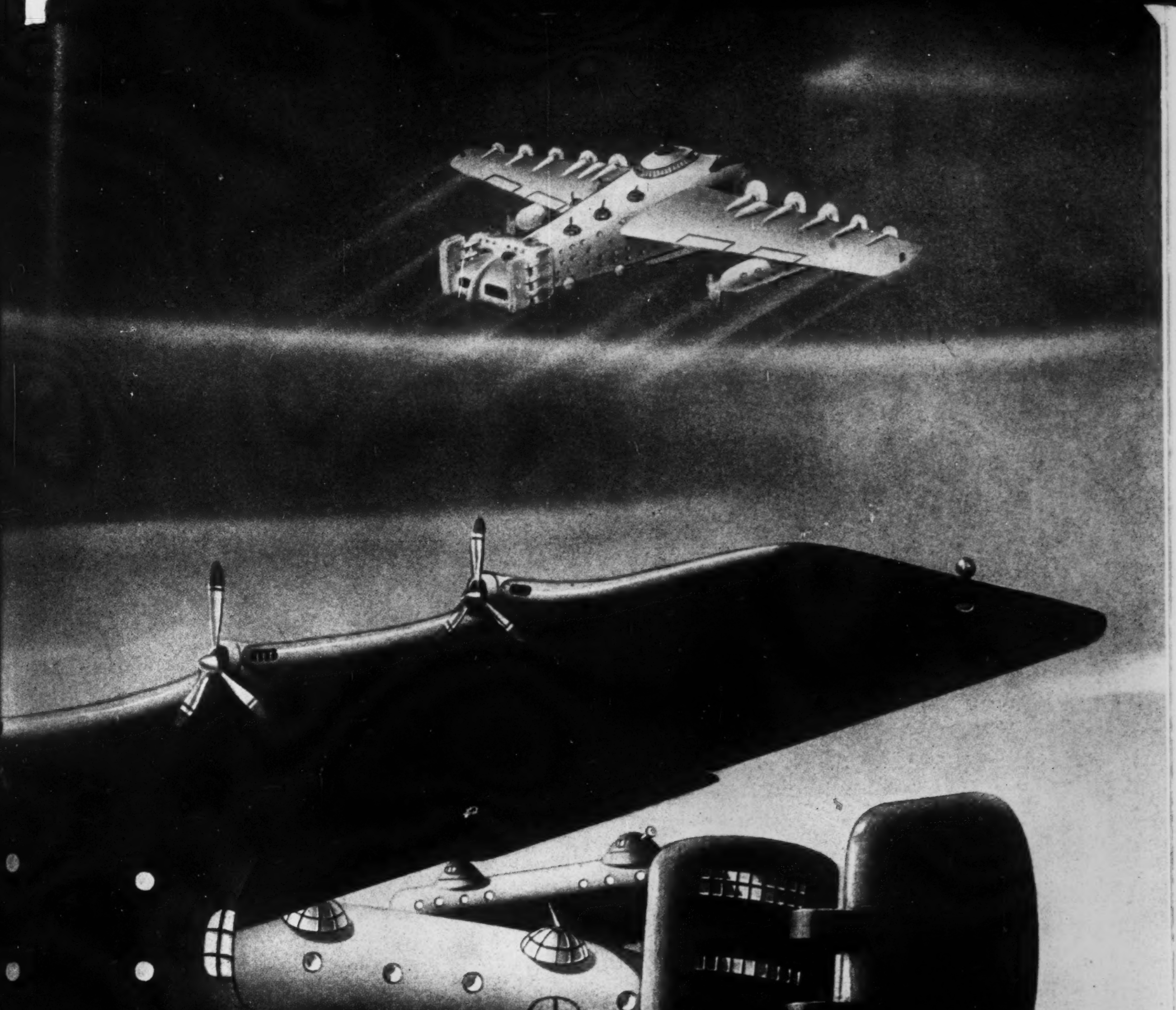


THE air terminals and landing fields to accommodate super air liners of tomorrow are being designed by Construction Engineers. America will lead the world in the development of Post war commercial air traffic and the necessary port facilities as it did with the development of the automobile and the great highway system so essential for rapid, safe transportation.

But . . . what about these future titanics of the air? Will the design and construction of airports to land and take off these liners be a bigger problem than the development of the liner itself? What is the limit to the size that these planes can be built? Our present methods of highway and airport design and construction may be found impractical if applied to the super air terminals of the future with landing wheel loads uncomprehendable today.

J. N. Heltzel, President of the Heltzel Steel Form and Iron Co. envisioned the possibility of 150-ton cargo planes and landing bases 4 feet thick at the Engineers' convention of the North Atlantic States in New York City, February 18, 1943. Heltzel engineers have developed the type of load transfer elements and expansion joints that will be required for the massive concrete slabs in these air terminals. These developments and our experience in all types of concrete construction are at your service.

A limited number of 15" by 22" reproductions of this terminal in color are available by writing the Heltsel Steel Form and Iron Co., Warren, Ohio.



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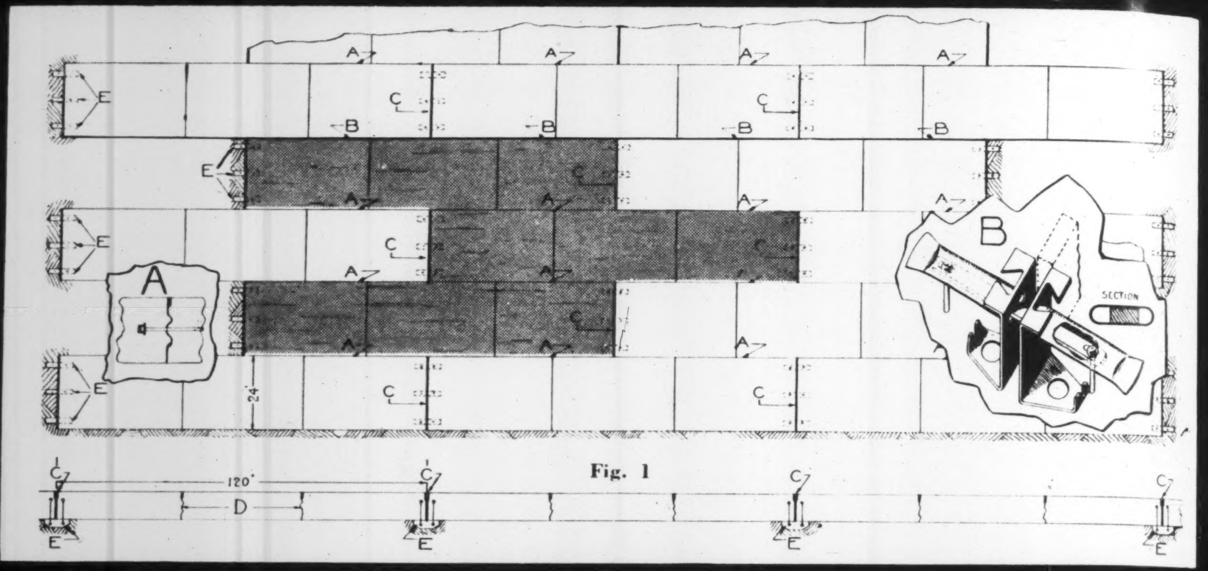


Fig. 1

STAGGERED EXPANSION JOINTS WITH EXPANSION JOINT BEAMS

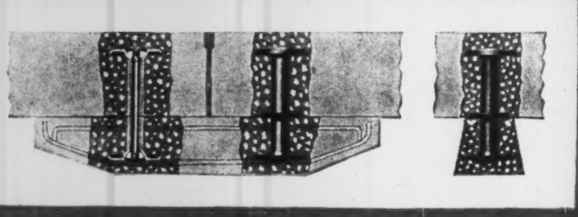


Fig. 2. Helco Universal Tension Dowel and Expansion Joint Beam for Airports.

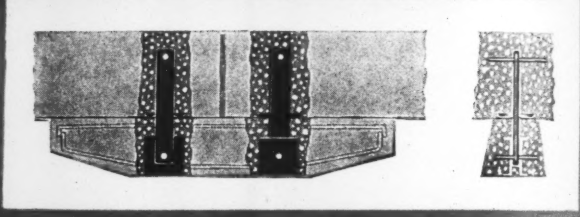


Fig. 3. Helco Tension Dowel and Expansion Joint Beams for Highways.

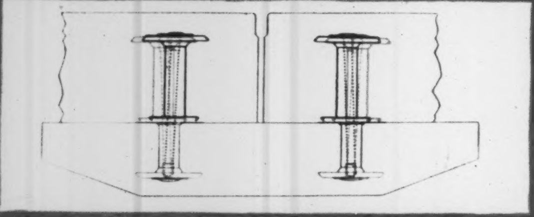


Fig. 4. Note universal action of the Helco Universal Tension Dowel. Allows expansion or contraction in any direction.

Expansion and contraction of slabs in concrete roads is longitudinal only.

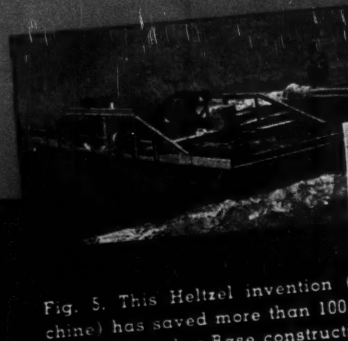
Expansion and contraction of slabs in concrete runways in airports hundreds of feet wide is in all directions. This will require certain changes in basic design.

Anticipating these trends, Heltzel engineers propose a pattern of staggered expansion joints indicated in Fig. 1. Concrete Expansion Joint Beams with Helco Universal Tension Dowels prevent pumping of joints and provide load transfer elements that permit expansion or contraction in any direction.

Slab movement is crosswise and lengthwise of the runways at the longitudinal expansion joint. The Helco Dual Action Dowel indicated as B in Fig. 1 provides a load transfer element and tie that allows for two way movement.

Complete details and data on load transfer elements, doweling systems, and expansion control for concrete airports of any thickness or width are available. INVESTIGATE.

Fig. 6. Now equipped with electric vibrators for asphalt or poured joints in concrete slabs.



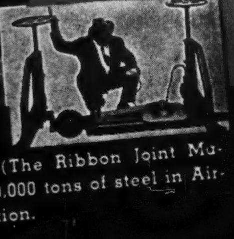


Fig. 5. This Heltzel invention (The Ribbon Joint Machine) has saved more than 100,000 tons of steel in Airport and Bomber Base construction.

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WARREN, OHIO · U. S. A.

U. S. Navy Official Photo

Finishers Follow FAST when VACUUM is used

Right on the heels of the vacuum gang come the finishers—for as soon as the vacuum mats are removed, they can go to work.

For a principle of the vacuum process is not only *suction*, to remove excess water—but also *Pressure*—from the atmosphere—¾ of a ton of it per square foot—to compact the concrete and close up any remaining voids.

Hence the newly poured surface is firm and solid and permits the finishing gang to walk right on and WORK.

And—the finishers say they like to handle vacuumed concrete. "There's plenty of fat" to trowel, even with economical mixes. No dust coat or "drier" is needed on Vacuum poured slabs.

And—SUCH concrete—

A mix designed for 2500 lb. compressive strength in 28 days, develops 4000 lb. or more.

Actually taken from a batch untreated by vacuum, a sample shows 2500 to 2800 in 28 days. Another sample from the SAME batch—but treated by Vacuum—actually develops 4000 to 4500 lb. in the same period of time.

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9 Factors Affecting the Life of Wire Rope (Contin

{This is number 18 in a series of articles prepared by Macwhyte Wire Rope Company for the benefit of wire rope users everywhere. All articles in this series are yours for the asking. Macwhyte Engineering Experience is available on specific problems.}

* * *

In the previous article of this series, the first four of nine factors affecting wire rope life or service were discussed. They were:

1. Abrasion or Wear
2. Bending or Flexing
3. Tension or Stress
4. Speed

As the article pointed out, these four can be kept from doing too much harm (to rope and machine) by frequent checkups.

While some of the four factors mentioned above are normal and to be expected, there are five other "rope saboteurs" which are *not* normal. These can be corrected. They are:

5. Crushing or Mashing
6. Weathering or Corrosion
7. Jerking or Shock
8. Vibration
9. Heat or Friction

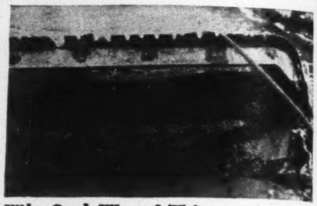
What can you do to correct them, and thus save steel and time now so urgently needed? Here are specific suggestions.

Not EVERY Enemy is found on the battlefront. Look...

Killed through Carelessness. Literally chewed to death, this rope was ruined before showing any normal wear.

Unnecessary Abrasion. A hoist rope was allowed to saw through a heavy plate. Such waste can and should be avoided.

Mashed to Death. Criss-crossed on the drum, this rope gave only a fraction of the service it might have, had more care been used in spooling.



Why Such Waste? This rope has been cutting a number of grooves in the bucket rim. It will give poor service and increase operating costs.

Crushing or Mashing

Improper winding (criss-crossing) on the sheaves or drums results in crushing or mashing. It *pays* to start the rope winding properly. Keep it from criss-crossing and reduce scuffing against the flanges of the drum and against the under layer to a minimum.

Where rope is loose on the ground (on incline slopes especially) it pays to prevent trucks or equipment from running over the rope. Lubricate rollers, sheaves, and guides so as to avoid undue abrasion. When rope jumps a sheave, stop and replace it before continuing the operation.

Permanent injury to the rope and damage to equipment can result if a rope is operated while out of its proper sheaves. In clamping or fastening the end of the rope use care to avoid needless damage.

Weathering or Corrosion

Wire rope is made of high carbon steel wire and will rust and corrode if not properly protected by a suitable lubricant, especially if it is not in constant use. Proper lubrication keeps the rope flexible and reduces wear as well as affording a protection against corrosion. (See article 10 in this series.)

Jerking or Shock

If there is slack in a rope, take it up slowly before the load is applied. This is where the human element enters the picture. Many a rope is ruined for lack of care on the part of the operator. A quick pickup with as little as 12 inches of slack will more than double the load on the rope and may cause it to snap. Even if the rope doesn't break immediately, it is weakened and breaks later in normal operation. (See article 15.)

Vibration

Vibration of wire rope in service fatigues the steel wires and consequently "tires" them out before they wear out. It is difficult to correct this except where this vibration is caused by faulty equipment and hurried handling. A clutch or brake may chatter and this vibration is multiplied many times throughout the length of the rope. Vibration may cause rope to break where it is dead ended (fastened). Where wire rope is fastened in a socket, continuous vibration will cause the wires to break right at the socket–cutting off a short section and refastening is a cure for this. A smooth pickup and steady operation will do much to eliminate vibration.

Heat or Friction

Heat changes the structure of steel. In general, it hardens it or makes it more brittle. Friction creates heat. Lubrication helps reduce friction. A stuck roller, poorly aligned sheave, scuffing agai
wraps of rope on a drum, scraping on ro
or metal creates friction and heat. W
rope must be kept free to do its job
bending. Heat and friction will change
steel composition and cause it to break
prematurely. Where ropes travel at hi
speed, watch out for the effects of heat.

Your Wire Rope Requirements

The benefit of years of experience bas
upon servicing equipment similar to you
is gladly given. When you ask Macwhy
for suggestions and recommendatio
you can be assured not only of gettin
"The Correct Rope for Your Equipment
but also a personal interest in helping y
get the most out of *your* rope.

Feel free to consult with Macwhyte di
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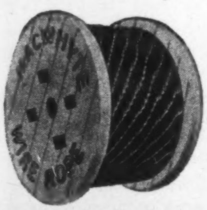
write to Macwhyte Company direct.



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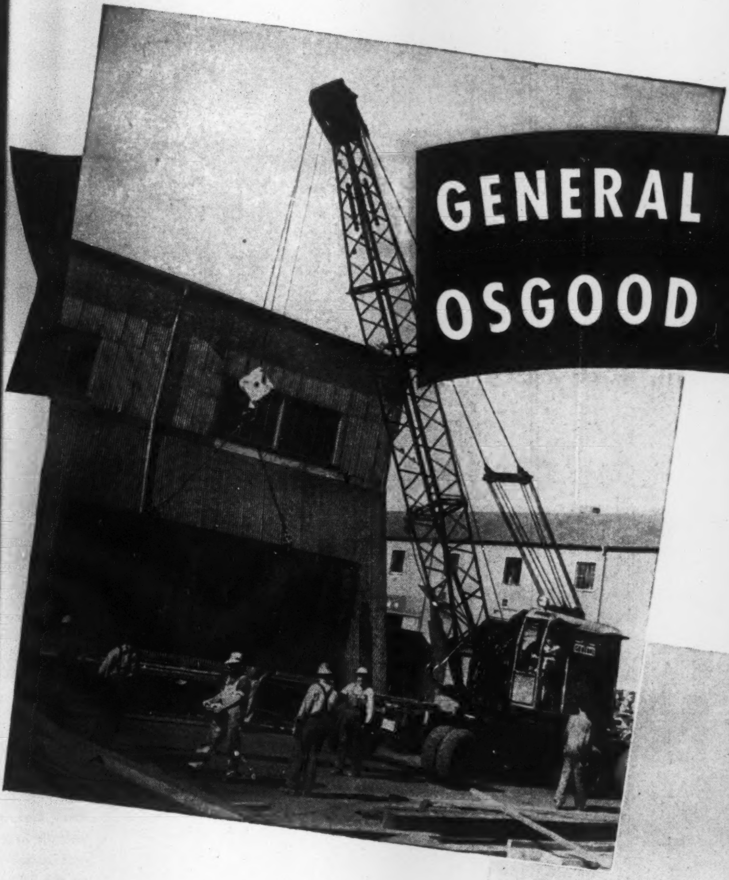

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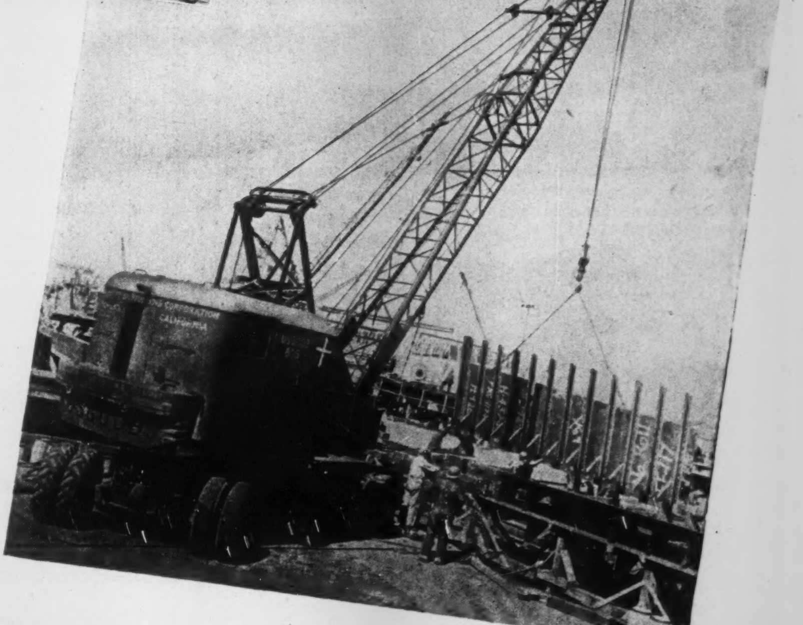

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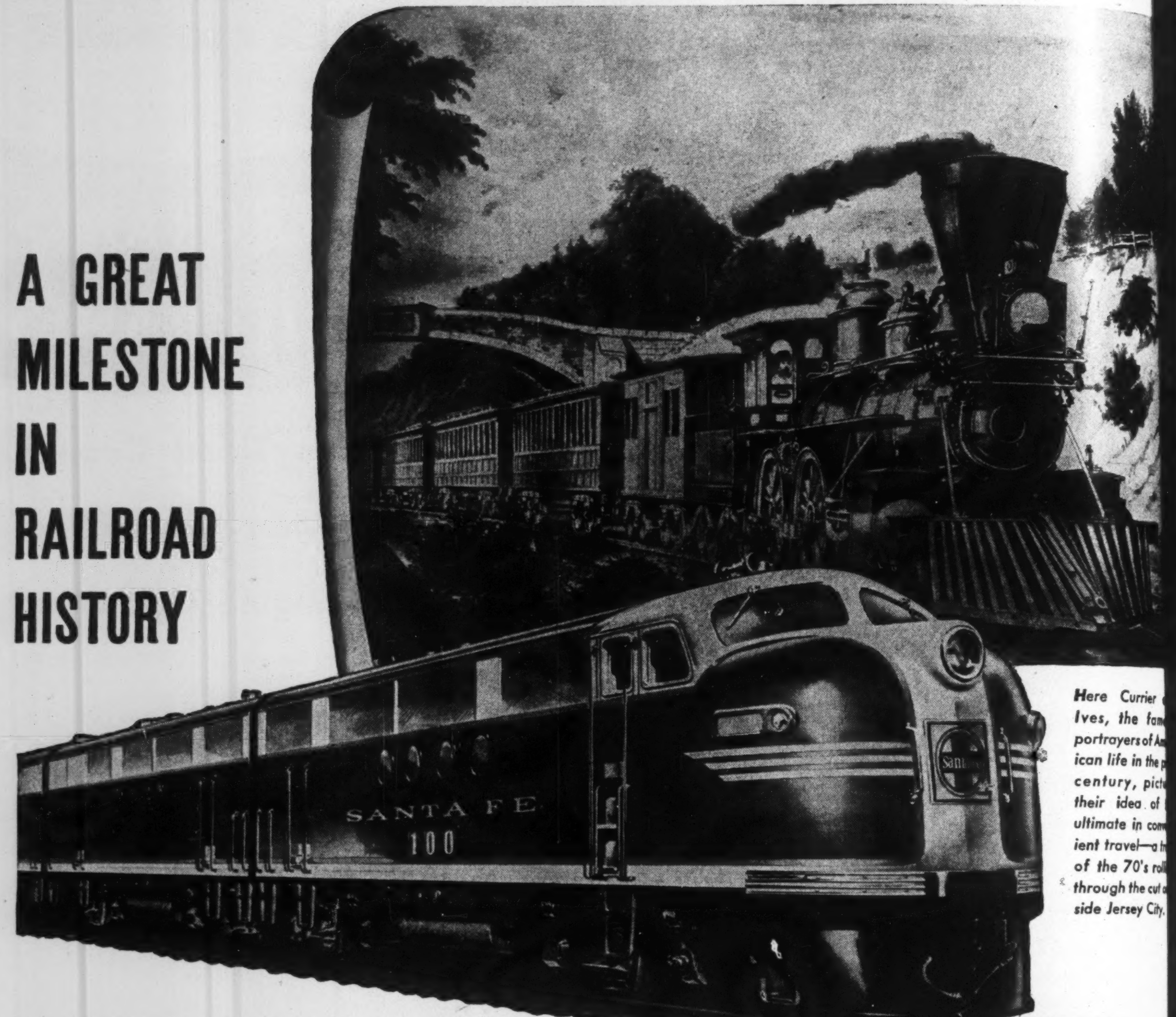

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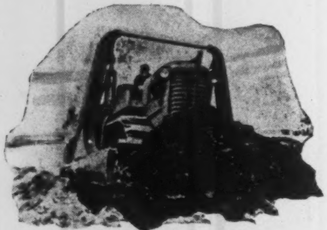

Reconstruction and new construction are going to need plenty of this hard-hitting, easy-on-fuel power. With normal refinement and development speeded up by war, with production expanded, GM Diesels will be ready to serve in more fields and in more ways than ever.

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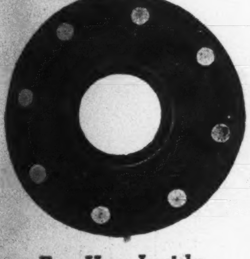

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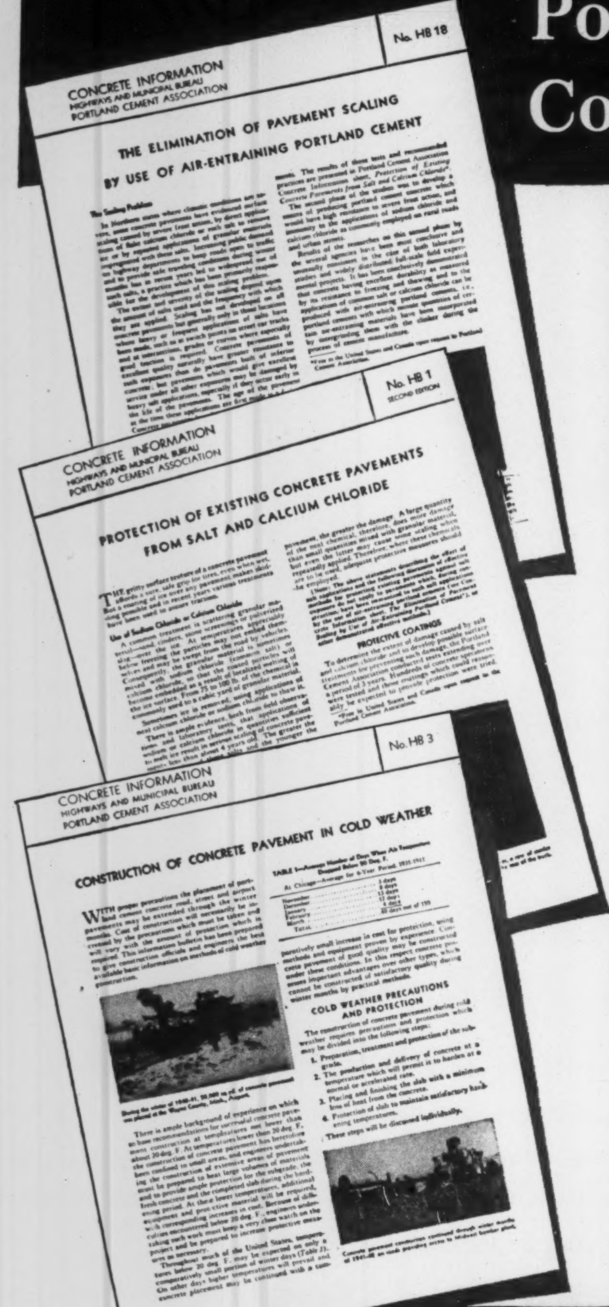

No. HB 18

CONCRETE INFORMATION
HIGHWAYS AND MUNICIPAL BUREAU
PORTLAND CEMENT ASSOCIATION

THE ELIMINATION OF PAVEMENT SCALING BY USE OF AIR-ENTRAINING PORTLAND CEMENT

No. HB 1
SECOND EDITION

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PROTECTION OF EXISTING CONCRETE PAVEMENTS FROM SALT AND CALCIUM CHLORIDE

No. HB 3

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CONSTRUCTION OF CONCRETE PAVEMENT IN COLD WEATHER

Technical research in laboratory and field has proved that concrete pavements built with air-entraining portland cement are highly resistant to severe frost action and scaling caused by use of sodium or calcium chlorides for ice removal.

Improved methods of protecting existing concrete pavements from such scaling are now available.

Advances have also been made in methods of placing concrete pavements in cold weather.

SCALE-RESISTANT CONCRETE PAVEMENTS

Four-page illustrated information sheet describes construction procedure using air-entraining portland cement to build pavements which resist severe frost action and scaling due to use of sodium or calcium chlorides for ice removal.

PROTECTION FOR EXISTING PAVEMENTS

Tested, economical methods of applying protective coatings to existing concrete pavements to prevent scaling from the above causes are described and pictured in a four-page information sheet.

PAVING IN COLD WEATHER

Eight-page illustrated information sheet gives specifications and describes latest methods of placing concrete pavements for roads, streets and airports during winter weather.

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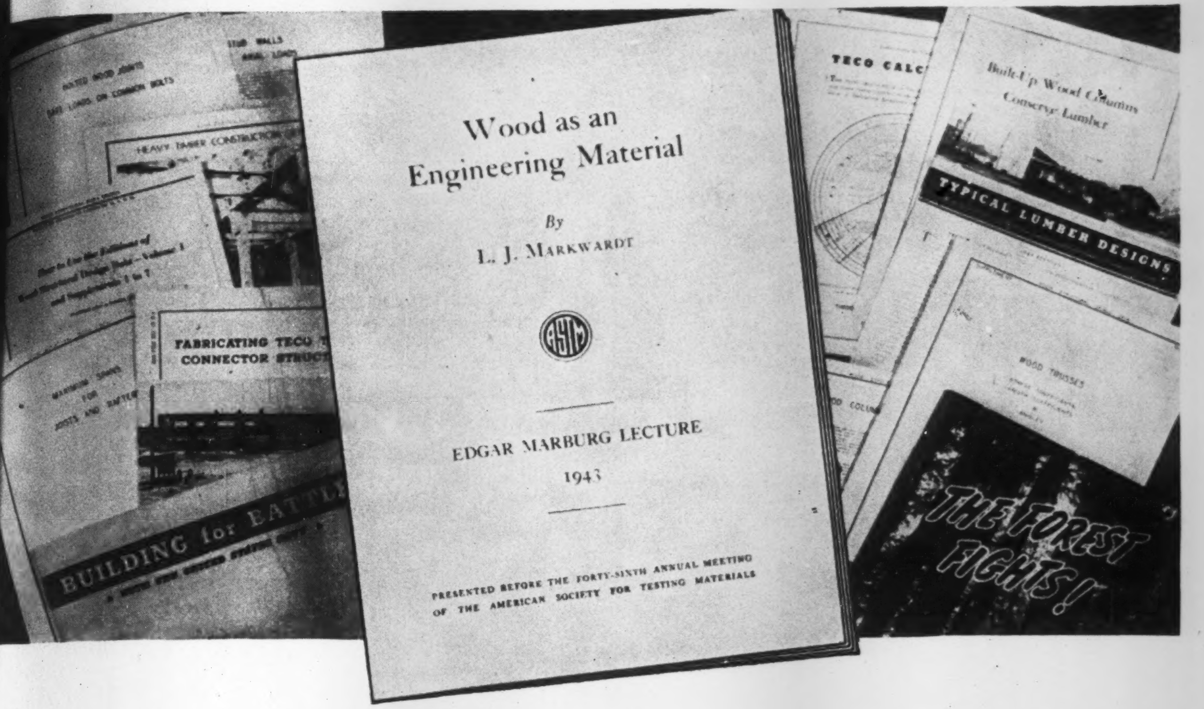
Wood as an Engineering Material
By
L. J. Markwardt
ASTM
EDGAR MARBURG LECTURE
1943
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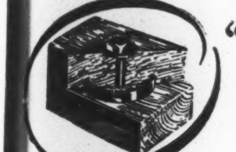

"Wood as an Engineering Material," by L. J. Markwardt, distinguished research authority of the U. S. Forest Products Laboratory, was presented at the invitation of the American Society for Testing Materials as the 1943 Edgar Marburg Lecture.

The purpose of this annual lecture is to present outstanding developments in the extension of knowledge of engineering materials.

In continuation of Teco's practice of making latest information on timber available to engineers and architects, copies of this lecture have been obtained and are available on request.

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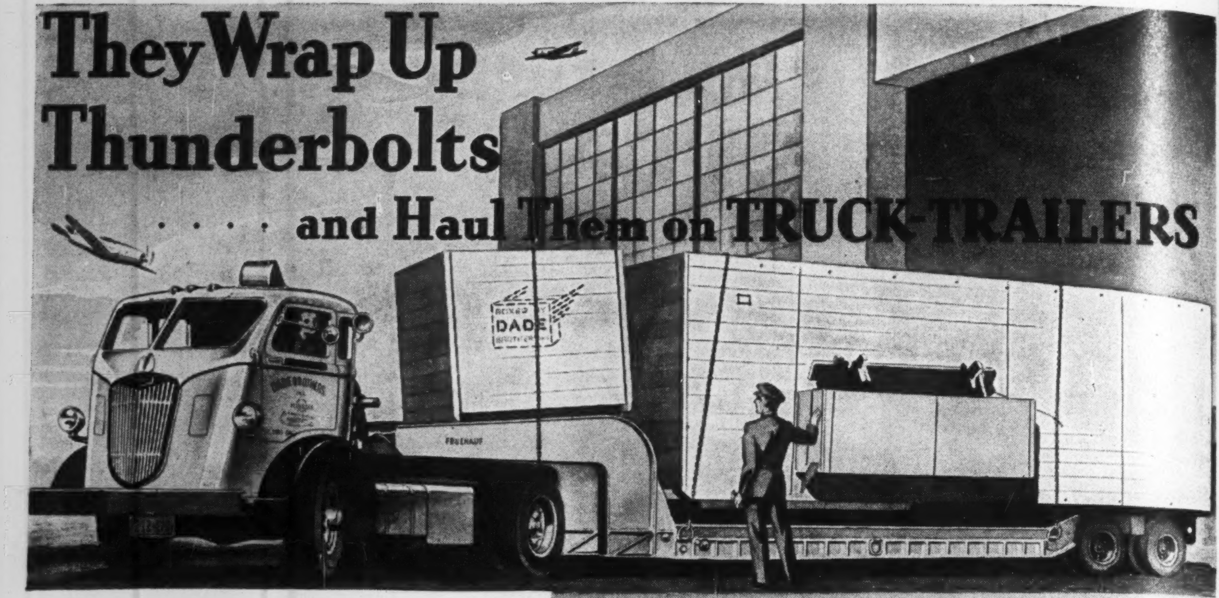
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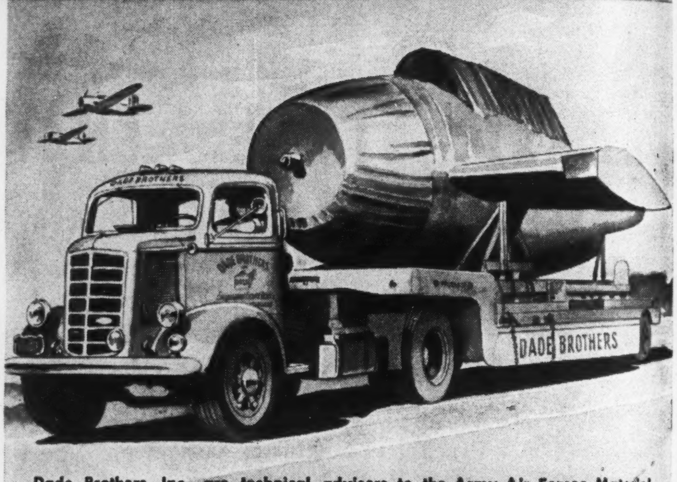
The preparation of these costly machines-of-war for shipment is a precise engineering job. But actually the most difficult task is *transporting* the huge loads to the ship-side . . . usually many miles away and through congested metropolitan traffic.

Truck-Trailers were the answer for Dade Brothers. In fact, there's no other transport method remotely practical for this work, Dade officials will tell you.

The Dade experience is typical of thousands of others in more than 100 lines of business . . . where Truck-Trailers are doing work that couldn't be done as well, if at all, by any other method. America could not get along without them.

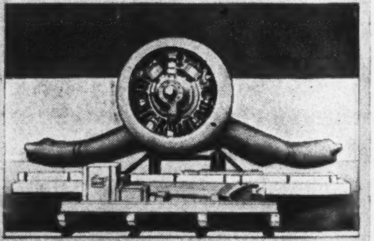
World's Largest Builders of Truck-Trailers

FRUEHAUF TRAILER COMPANY
DETROIT, MICHIGAN
Service In All Principal Cities


DADE BROTHERS
DADE BROTHERS

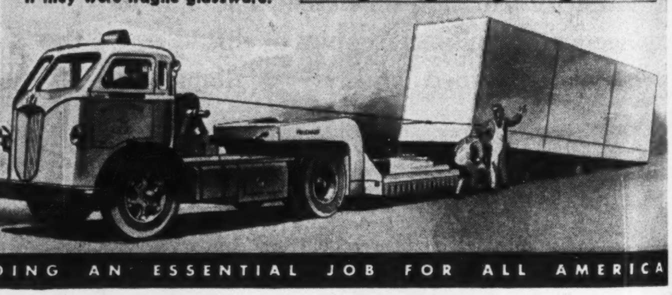
Dade Brothers, Inc., are technical advisers to the Army Air Forces Materiel Command. Airplanes prepared by them for export shipment are so mounted that the stress and strain centers are exactly the same as those encountered in flight and landing. If the cases are tipped on end, or overturned, the planes will still not touch the cases except at the mounting points.

Right—A Vought "Corsair" being readied for travel to the battle zone. Wing-butts have been weather-sealed and the fuselage mounted on the floor-stringer of the export case.

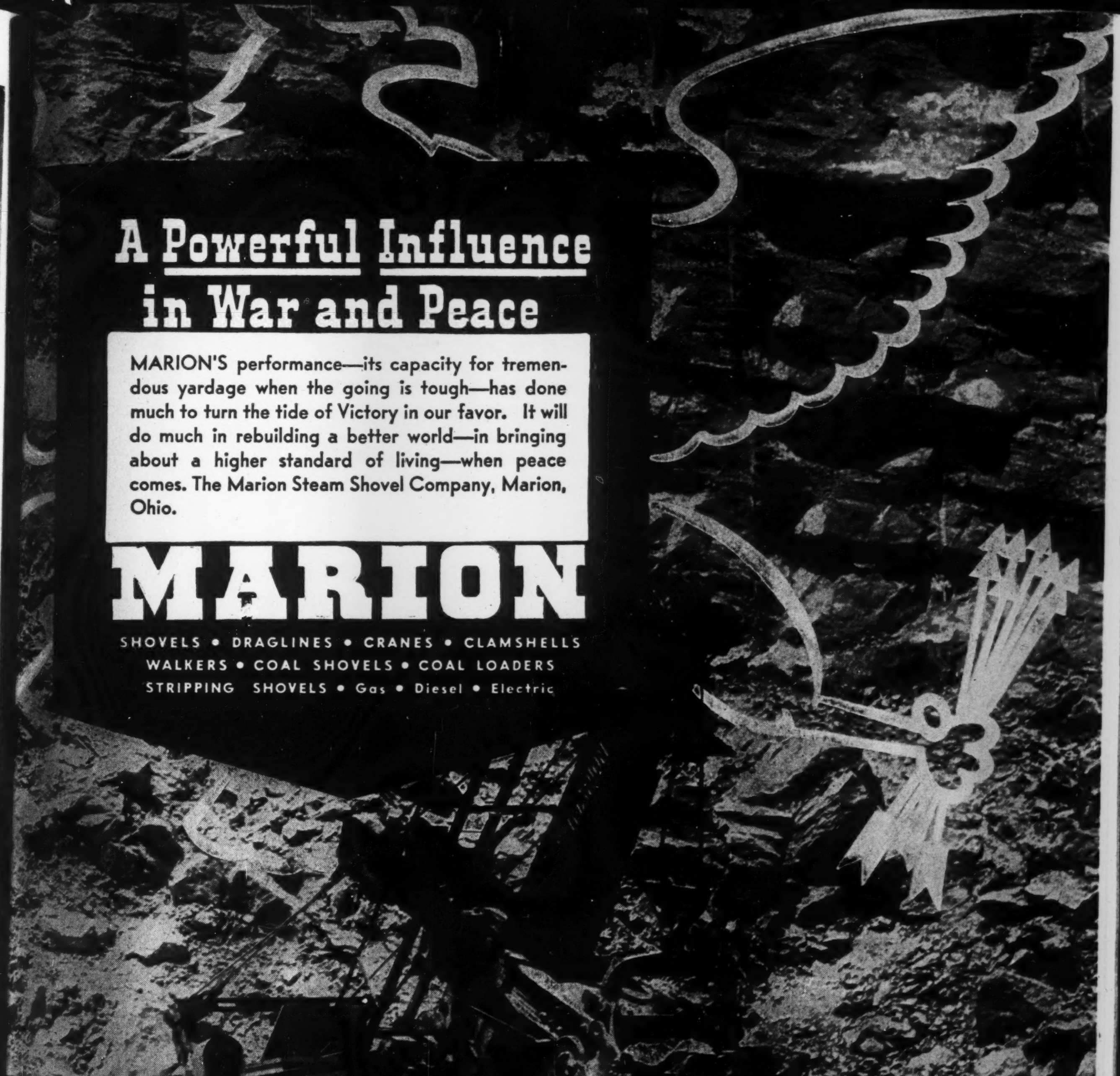


Below—High speed automatic winches on the Truck-Trailers help get the cases aboard ship quickly and safely. These precious cargoes are handled as if they were fragile glassware.

Back the Attack!
FRUEHAUF Trailers
"Engineered Transportation"
REG. U. S. PAT. OFF.
A TRUCK IS LIKE A HORSE
IT CAN PULL MORE THAN IT CAN CARRY
Buy
War Bonds!



TRUCK-TRAILER TRANSPORT IS DOING AN ESSENTIAL JOB FOR ALL AMERICA


FOR VICTORY
BUY
UNITED STATES
WAR
BONDS
AND
STAMPS

A Powerful Influence in War and Peace

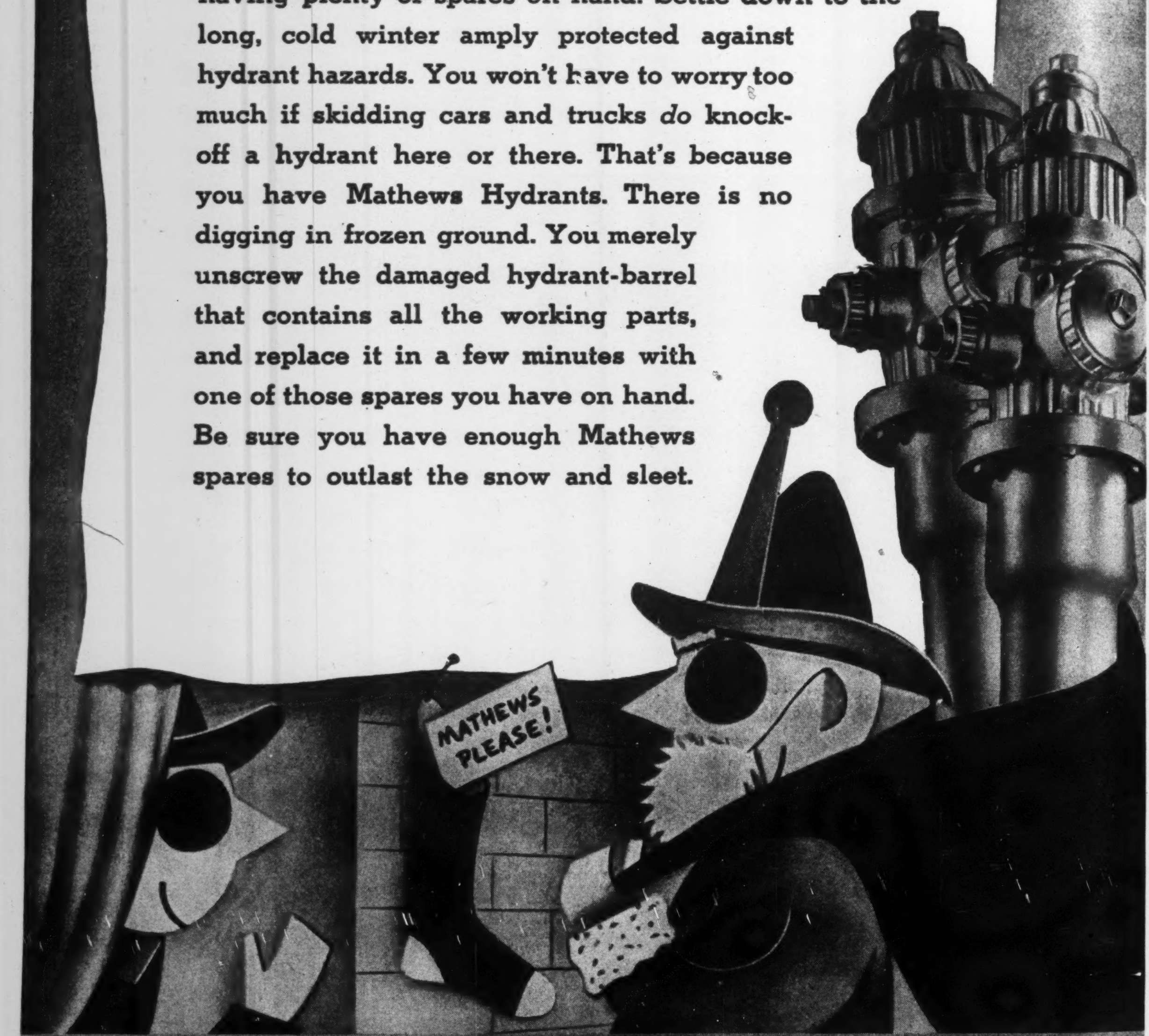
MARION'S performance—its capacity for tremendous yardage when the going is tough—has done much to turn the tide of Victory in our favor. It will do much in rebuilding a better world—in bringing about a higher standard of living—when peace comes. The Marion Steam Shovel Company, Marion, Ohio.

MARION

SHOVELS • DRAGLINES • CRANES • CLAMSHELLS
WALKERS • COAL SHOVELS • COAL LOADERS
STRIPPING SHOVELS • Gas • Diesel • Electric

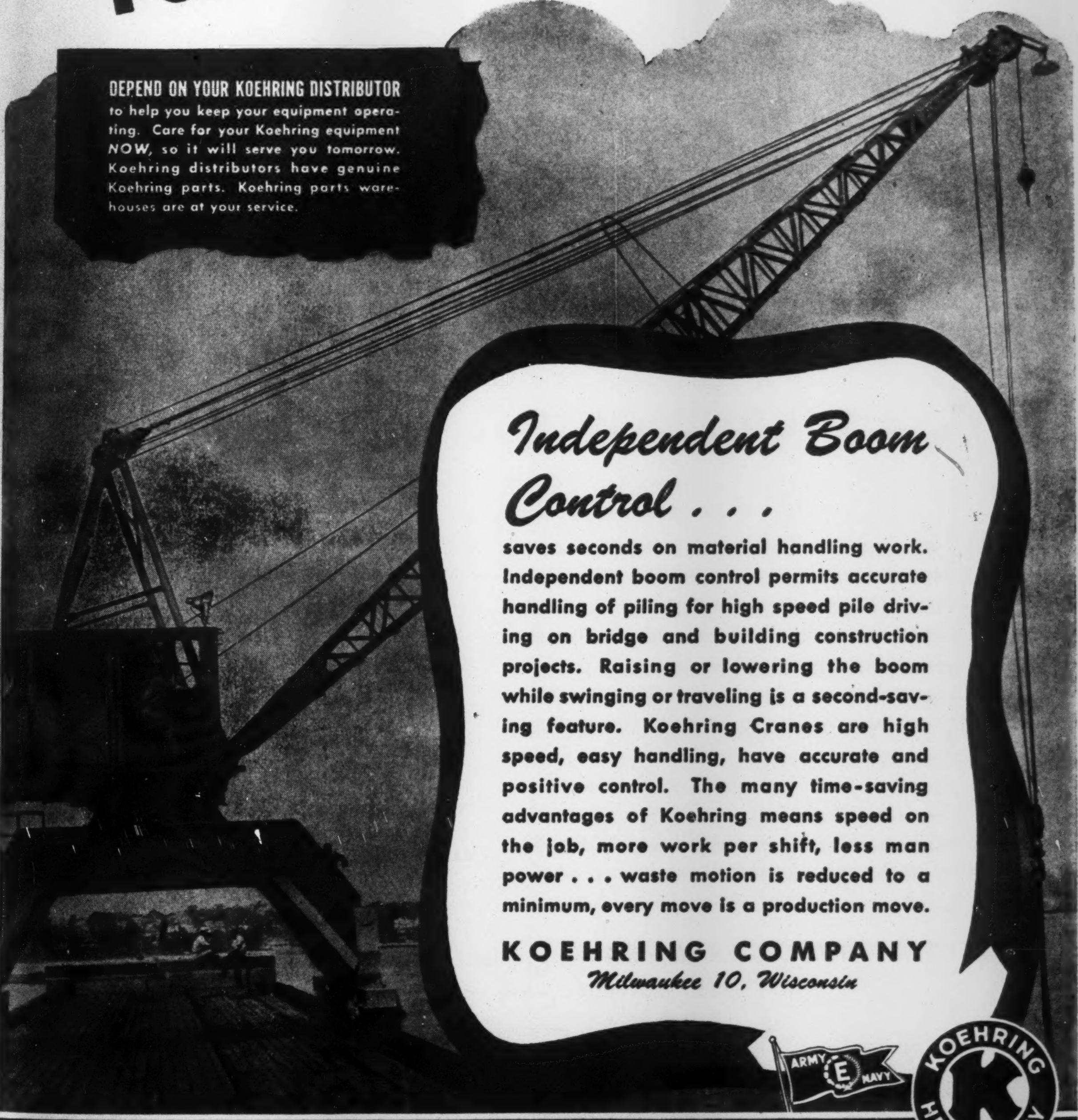
WINTER TIME IS "STOCKING" TIME

Give yourself the peace-of-mind that comes with having plenty of spares on hand. Settle down to the long, cold winter amply protected against hydrant hazards. You won't have to worry too much if skidding cars and trucks *do* knock-off a hydrant here or there. That's because you have Mathews Hydrants. There is no digging in frozen ground. You merely unscrew the damaged hydrant-barrel that contains all the working parts, and replace it in a few minutes with one of those spares you have on hand. Be sure you have enough Mathews spares to outlast the snow and sleet.


MATHEWS PLEASE!

MATHEWS HYDRANTS
400 CHESTNUT STREET, PHILADELPHIA, PA.
ESTABLISHED IN 1803
Made by R. D. WOOD Company
MANUFACTURERS OF SAND SPUN PIPE (CENTRIFUGALLY CAST IN SAND MOLDS) AND R. D. WOOD GATE VALVES

Positive Control FOR ACCURATE SPOTTING



DEPEND ON YOUR KOEHRING DISTRIBUTOR to help you keep your equipment operating. Care for your Koehring equipment *NOW*, so it will serve you tomorrow. Koehring distributors have genuine Koehring parts. Koehring parts warehouses are at your service.

Independent Boom Control . . .

saves seconds on material handling work. Independent boom control permits accurate handling of piling for high speed pile driving on bridge and building construction projects. Raising or lowering the boom while swinging or traveling is a second-saving feature. Koehring Cranes are high speed, easy handling, have accurate and positive control. The many time-saving advantages of Koehring means speed on the job, more work per shift, less man power . . . waste motion is reduced to a minimum, every move is a production move.

KOEHRING COMPANY
Milwaukee 10, Wisconsin

ARMY E NAVY

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

YOU CAN BE SURE
THE POWER'S RIGHT

with a PIERCE Governor on the Engine!

● With the scoop full or empty . . . the boom dragging or swinging free . . . the load on the power unit is continually changing. It's the governor's job to automatically adjust the engine throttle to meet these changes, keep the engine speed constant, and provide exactly the right amount of power every second.

That's why Pierce Governors are so widely used in governing engine speed on gasoline, gas, or Diesel-powered equipment. Pierce Flyball Governors respond instantly to meet any change in load, making possible uninterrupted efficient operation of equipment. They hold engine speed constant, regulating within the closest limits, and provide unfailing protection for your equipment.

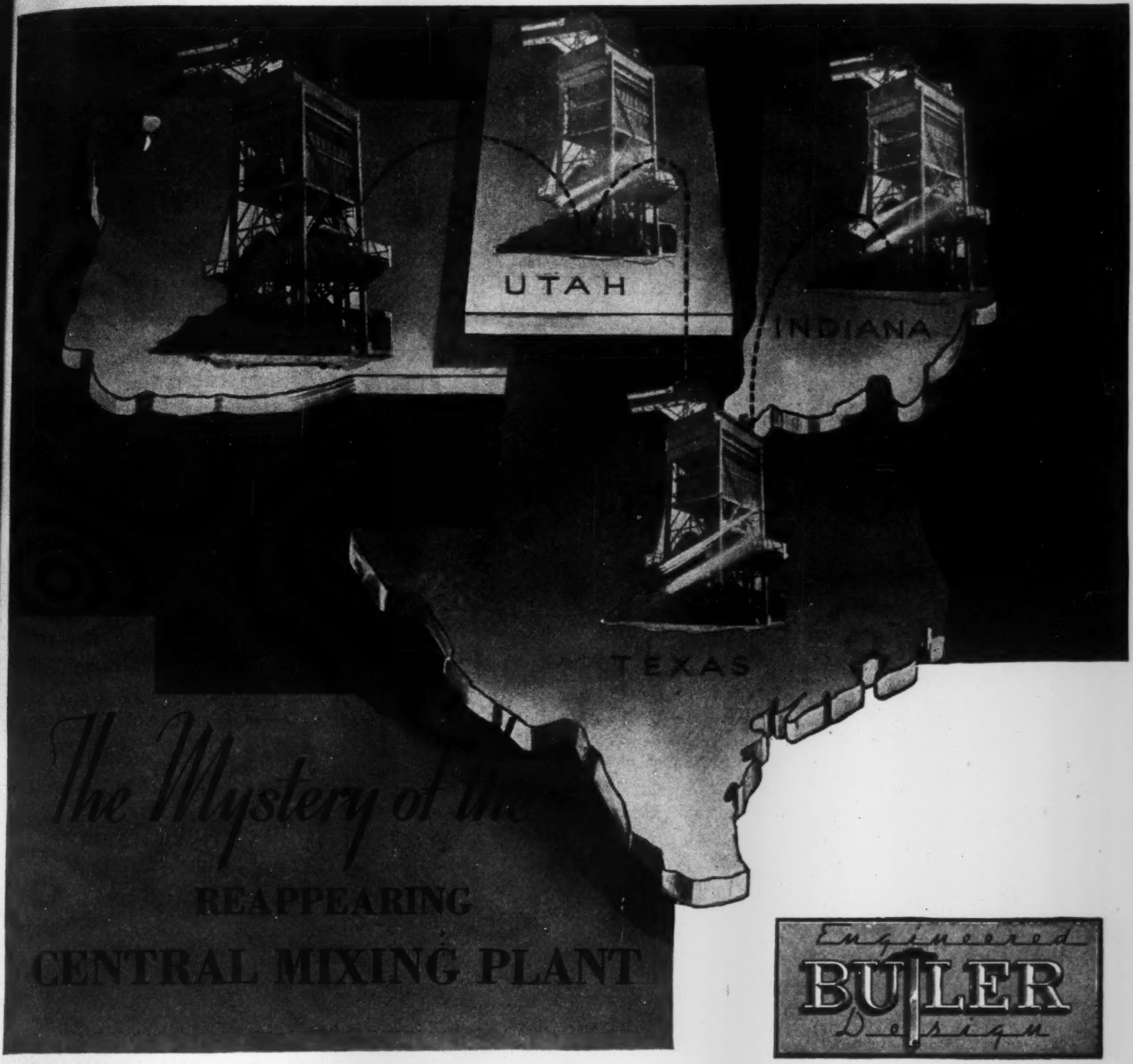
Pierce's time-proven flyball design coupled with their rugged, high quality construction assure you of top performance year after year. Like leading engine manufacturers, you, too, will find it profitable to standardize on Pierce Flyball Governors on the equipment you use.

THE PIERCE GOVERNOR COMPANY, INC.
1647 OHIO AVENUE • ANDERSON, INDIANA

NOW . . . and after the war . . . insist on Pierce Flyball Governors when you purchase new equipment!

Pierce Governors

STANDARD SINCE 1913



The Mystery of the REAPPEARING CENTRAL MIXING PLANT

Engineered BUTLER Design

Be on the lookout for a Butler central mixing plant; height about 75 feet; wearing a coat of gray paint; last reported in the State of Washington; has also been seen in Texas, Utah, and Indiana. Has a long record of production—nearly 600,000 cubic yards of concrete poured, and more to come. 150 yards per hour for days on end.

Though it sounds something like a mystery novel, there is really nothing mysterious about the remarkable performance of this plant—it is a Butler Engineered Design. Butler engineers have been designing plants for more than twenty years, plants whose efficiency, dependability, and versatility are built in. No wonder, then, that they are as good on their tenth job as on their first.

If you have a concrete job, large or small, be sure to call upon the Butler engineer. His suggestions are available to you regarding central mixing plants, ready mixed concrete plants, bulk cement plants, batch bins, and crushing plants. The first step toward the most successful job is Butler Engineered Design.

BUTLER
BIN COMPANY
WAUKESHA, WISCONSIN

INLAND
Steel Sheet Piling

- Wide range of sections
- Special analysis for extreme strength
- Free driving, yet water-tight under pressure
- Corrosion resistant

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SALES OFFICES
MILWAUKEE DETROIT
ST. PAUL ST. LOUIS
KANSAS CITY

How to check your performance for

Maximum Tournapull Operating Efficiency

Use this Simple LeTourneau Check-List—It Covers Your Complete Earthmoving Cycle, Shows You How to Move Bigger Loads Faster and at Less Cost

LOADING . . . Check These Points √

1. Are loads heaped each trip?
2. Is the load being obtained in 100 feet or less?
3. Is the load obtained in 1.0 minute or less?
4. Is traffic control keeping units coming into the pit at intervals of 1.5 to 2.0 minutes so that the pusher tractor will work efficiently—and so avoid unnecessary waiting by Tournapull units?
5. Is the pusher step-loading to reduce lost time and travel in the pit? (See job photo below left)
6. If the material is too hard to load in efficient time and distance, is Rooter being used to break it up?
7. Always establish down-hill loading. It's rarely ever impossible.

TRAVELING . . . Check These Points √

1. Are roadways good enough to allow high gear travel at all times? 14 m.p.h. or over? If not . . .
2. Is the Tournapull-Scraper being used to keep haul roads in good condition? Or is a Patrol available as the logical tool for this work?
3. Is each turn being made in .25 minute or less?
4. Is the operator utilizing full r.p.m. to obtain the quickest acceleration—thus increasing average speed?

SPREADING . . . Check These Points √

1. Are loads being spread in the highest possible gear?
2. Is spread made in .5 minute or less?
3. Is spread being made in 65 to 100 feet (approx. 8 inches to 5 inches loose depth)?
4. Is operator getting off the fill as quickly as possible?

MECHANICAL . . . (Check with LeTourneau Maintenance Manuals) √

1. Are all adjustments maintained?
2. Are blades installed properly to maintain sharp cutting edge?
3. Is all cable running free?
4. On hard smooth roads, are tires at maximum pressure? (See LeTourneau Tire Chart)
5. For off-the-road work, are tires at minimum pressure, in relation to the load, to obtain flotation? (See LeTourneau Tire Chart)
6. Are all mechanical moving parts greased and operating freely? (See LeTourneau Lubrication Chart)

To help you take fullest advantage of your Tournapulls' ability to move bigger yardages fast, here is a quick, easy way to check every operating step. This simple Tournapull check-list, prepared by the LeTourneau Field Engineering Department, shows you how to keep your rigs working at top efficiency in the cut, traveling and on the fill. Use it regularly for your Turnapull check-up to eliminate waste time and speed yardage output.

Another Time-Saver—Dealer Service

If your check-up shows a need for parts or repairs, call on your LeTourneau-"Caterpillar" dealer. He's equipped to handle your service problems with a minimum of time out for repairs.

LeTourneau Co-Operator Offers More Help—Write for Copy

To keep your operators and repair crews informed on the most practical operating, service and repair methods, The LeTourneau Co-Operator is offered to you and your men FREE. 16 fact-packed pages . . . published 10 times yearly. Read regularly by over 50,000 contractors, loggers, miners and others who use and service LeTourneau equipment. Write for your copies TODAY. Address R. G. LeTourneau, Inc., Dept. NR Peoria, Illinois.

By loading its Model C Tournapulls both ways in the borrow pit, Calumet Paving Co., Indianapolis, Ind., cuts the travel time of its pusher tractor to the minimum. Notice how, as the loaded Tournapull pulls out of the pit, the pusher tractor is ready to swing around and contact the second Tournapull, already loading in the opposite direction. Smart time-saving operation!

Manufacturers of DOZERS, CARRYALL* SCRAPERS, POWER CONTROL UNITS, ROOTERS*, SHEEP'S FOOT ROLLERS, TOURNAPULLS*, TOURNAROPE*, TOURNA-TRAILERS, TOURNAWELD, TOURNACRANES*.

*Trade Marks Reg. U. S. Pat. Off.

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PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

CUT
Over-all
Placing
COSTS
with a Mall
TRADE MARK
VIBRATOR
1½ H. P. UNIT
GASOLINE POWERED

ARMY E NAVY

★★ Immediate delivery on Gasoline Powered 1½ H.P., and wheelbarrow or round base mounted 3 H.P. units on suitable priority.

●

BACK THE ATTACK BUY WAR BONDS

★ For their size, MALL Vibrators place more concrete per hour than any other vibrator.
★ They place a stiffer mix with important savings in cement, sand and labor.
★ MALL vibrated concrete assures a better bond with reinforcement . . . is free from honeycombs and voids . . . permits earlier stripping of forms . . . and makes a stronger, water-tight job.
★ MALL Vibrators are easily portable, use very little fuel, are easy to start, and require little attention.
★ MALL Vibrating elements are ruggedly constructed for long service with welded, special metal tips that withstand abrasive action.
★ Variable speed gasoline engine operates 8 other tools easily interchangeable with the vibrating element.

Write at once for full details.

● **MALL TOOL COMPANY** ●
7730 SOUTH CHICAGO AVE. CHICAGO 19, ILL.

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STRUCTURAL STEEL
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MOUNT VERNON, OHIO

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LOCOMOTIVE CRANES

15 to 50 TONS CAPACITY

DIESEL • ELECTRIC • GASOLINE • STEAM
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The OHIO LOCOMOTIVE CRANE CO.
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FOR SEWAGE TREATMENT AND WATER SUPPLY . . .

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● Venturi Tubes, Weirs, Flumes, Nozzles and other primary elements; Mechanically and Electrically operated Registers and Complete Automatic Control Systems.

BAILEY METER COMPANY
1029 IVANHOE ROAD • CLEVELAND, O.
Bailey Meter Co. Ltd., Montreal, Canada

POSTWAR PROJECTS (Cont'd.)

O., Barberton—City, sewers, Snydertown Dist., $30,200; West End Sewer Dist., $200,000; storm sewers, $216,520. H. Bushey, City Hall, city engr.

★ **O. Cleveland**—City Planning Comn., City Hall, plans partially completed storm sewers, Bernice Ave. from Rocky R. Dr. to west of W. 196, $124,309; Elsmere Ave. from Rocky R. Dr. to west of W. 196 St., $28,817; Maplewood Ave., from Rocky R. Dr. to west of W. 196 St., $30,719; Orchardhurst Ave. from Rocky R. Dr. to W. 202 St., $28,025; Westlawn Ave. from Rocky R. Dr. to W. 202 St., $25,546; Ponciana Ave. and Flamingo Ave. outlet sewer; Puritas Ave. from west of Grayton to Rocky R. Dr.; sanitary sewers, Puritas Ave. from west of Grayton to Rocky R. Dr., $86,375; sewage pumping stations at Jennings and Big Creek, $56,650; at W. 29 and Division Sts., $84,975; sewage pumping station and outlet sewer at Superior St. and Cuyahoga R., $66,500; sewers, Big Creek, from Bellaire to W. 117 Sts., $309,000; Big Creek from Emery, 1100 ft. N'ly., $154,500; Big Creek from W. 118 to W. 130 Sts., $477,920; Big Creek from Worthington to B. & O. R. R., $339,282; Brookpark Rd. from Rocky R. Dr. to Grayton St., $26,090; Buckeye Rd. from E. 116 to S. Moreland St., $214,807; Burke Brook, from Grant St. to N. & S. S. R. R., $25,750; Burke Brook in Washington Park and Pistol Range, $37,080; Burke Brook, through Washington Park, $156,560; Cedar Ave., from E. 65 to E. 79 Sts., $124,630; Cedar Ave., from E. 90 to E. 93 Sts., E. 90 St. from Euclid to Cedar Aves., E. 93 St. from Cedar Ave. to Quincy St., $247,494; Cooley Ave. from W. 120 to W. 127 Sts., $103,500; Corlett Ave. from E. 116 to E. 127 Sts., $51,500; Cuyahoga R. low level district, from Republic Steel Corp. to Walworth Run, $103,000; Cuyahoga R. low level district, in Superior, Merwin, James and Canal Rd., $131,840; Cuyahoga R. low level district from W. 29 to Center Sts., $36,050; Dugway Brook, from N. Y. C. R. R. to north of St. Clair Ave., $272,950; E. 40 St., outlet to Kingsbury Run, $41,200; E. 70 St., from Hough to Euclid Aves., $126,175; E. 93 St. from Hough to Lamont Aves., $33,114; E. 110 St. from Euclid to Carnegie Aves., $26,876; E. 123 St. from Buckeye Rd. to Forest Ave., $25,905; E. 131 St. from Coit to St. Clair Aves., $31,930; E. 132 St. from Buckeye Rd. to Livingston St., $27,295; E. 140 St. from Union to Melzer Sts., $48,328; Euclid Ave. from E. 82 to E. 102 Sts., $201,880; Fulton Rd. from Memphis St. to Park Dr., $38,728; Grayton Rd. from Hillside Rd. to Puritas Ave., $51,500; Homeway Rd. from west of W. 190 St. to Fairville Ave., $97,962; Kingsbury Run, from Sidaway to E. 79 Sts., $180,250; Lorain Ave. from N. Y. C. R. R. to W. 157 St., $144,200; Mill Creek Branch from Lee to Alonzo Sts., $51.500; Professor Ave. from W. 10 to Starkweather Sts., $25,750; Rocky River Dr. from Puritas Ave. to Brookpark Rd., $123,384; Shaw Brook from Taft to Kirby Sts., $94,090; Spring Road, from W. 19 to W. 12 Sts., $60.358; W. 7 St. from Railway to Mary Sts., $103,000; W. 10 St. from Railway to Starkweather Aves., $36,050; W. 196 St. from Bernice Ave. to Brookpark Rd., $27,427; Woodland Ave. from E. 79 to E. 83 Sts., $123,600; E. 33 St. from Cedar to Central Aves., E. 33 St. from Central to Scovill Aves., E. 31, E. 34, E. 35, E. 36, E. 37, E. 38, E. 39, E. 43 and E. 49 Sts., Sandusky Ave. relief sewer Gay and Greenwich Sts. from E. 104 to E. 114 Sts., Corlett Ave. from E. 114 to E. 116 Sts., Gay from E. 100 to E. 104 Sts., E. 100 St. from Sandusky to Gay St., $206,000; intercepting sewer from Puritas Ave. to W. 191 St. and Golfview Dr., $47,290; plans not yet started sewers Bellaire Rd. from Big Creek to Jaspar Sts., $51,500; Chester Ave. from E. 55 to E. 93 Sts., $46,350; Scranton Rd. from Kenilworth to Trowbridge Sts., $154,500; E. 48 Pl., Flamingo Ave., W. 53 St., storm sewer Ponciana Ave., City for Div. Engineering & Construction; Easterly Sewage Treatment Works expansion, $115,000; Southerly Sewage Treatment Works expansion. $2,817,500; Westerly Sewage Treatment Works expansion, $1,564,500, City for Div. Sewage Disposal.

★ **Tex., Houston**—City, storm sewers, $950,000.

★ **B. C., Saanich**—City Councillors, City Hall, sewerage sys., $1,000,000

BRIDGES, GRADE CROSSING ELIMINATION

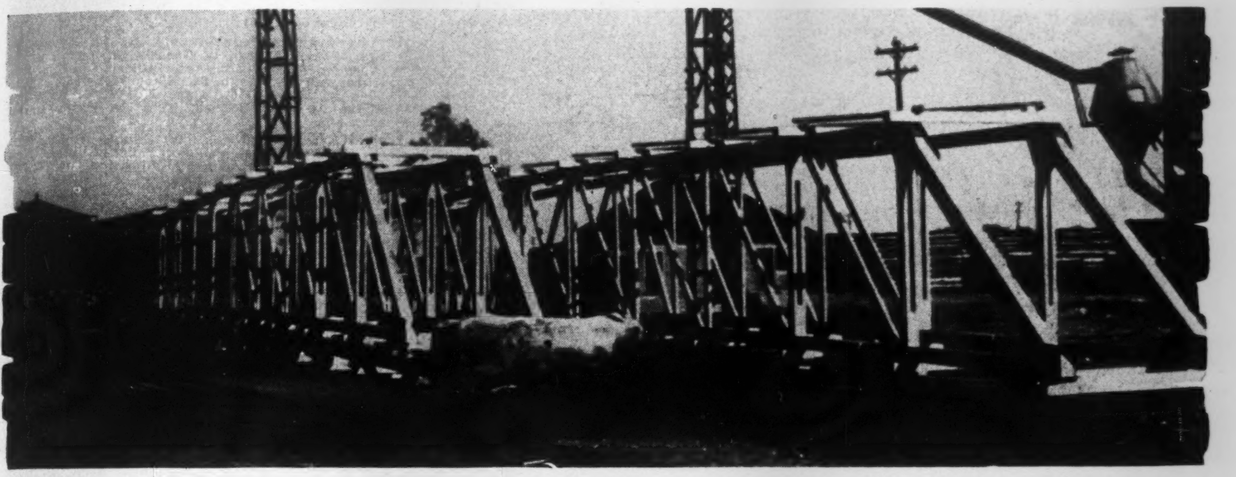
★ **New York**—Dpt. P. Wks., Bureau Hys., Albany, grading, structures, separation of grades 0.43 mi. Northern State Parkway at County Line Rd., Round Swamp Rd., Sweet Hollow Rd., and S.H. No. 794, $505,000; 0.31 mi. Northern State Parkway at S. Oyster Bay Rd., Woodbury Rd., Plainview Rd. and Sunnyside Blvd. Extension, $510,000; 0.3 mi. Northern State Parkway at Cantiague Rd., Burrill Rd., Bway., Long Island Railroad (Northport Branch) and Miller Place, $450,000 all foregoing Nassau Co., **plans under way**; 0.33 mi. viaduct Bronx River Parkway over E. 180 St., Morris Park Ave., N. Y., W & B R. R. and I. R. T. R. R., Bronx Co., $960.000 **plans complete.**

★ **New York**—Long Island R.R. Co., C. E. Adams, ch. engr., Pennsylvania Station, New York, Old Southern-Rosedale grade crossing elmination, Queens Co., $4,805,000. Plans under way.

THIS BRIDGE IS

Pre-Assembled to Assure Accuracy

Pressure Creosoted to Assure Durability!



This bridge was pre-assembled in the yard of one of our treating plants . . . to make sure that every detail of the framing was correct.

It was then dis-assembled, and every part pressure-treated with creosote . . . to make sure that it would give many years of maintenance-free service, unaffected by decay or termites.

One of the most important contributions of pressure-treated wood today is in expediting construction of needed structures. For many years it has been an accepted permanent building material in the highway and railroad fields. It effects large savings both in first cost, and in maintenance. One investigation revealed that the cost of 9 pressure-creosoted bridges was only *one-third* that of other types of permanent construction.

Timber structures can be "engineered" like any others. Structural members can be completely framed and match-marked to blue-print, ready for assembly without cutting or fitting. This view shows a detail of the bridge illustrated above. Teco connectors were used in erection.

Pressure-treated wood is serving . . . and saving . . . in a dozen different fields. Some of its many important jobs are illustrated and described in this new bulletin, "Economical and Permanent Construction with Pressure-Treated Wood." We will be glad to send a copy; just write.

KOPPERS COMPANY • WOOD PRESERVING DIVISION • PITTSBURGH, PA.

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THE INDUSTRY THAT SERVES ALL INDUSTRY

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TRADE MARK
STEEL TAPES

K&E
REG. U. S. PAT. OFF.

Easy-to-read, *raised* black graduations on crack-proof white surface ... resist abrasion from rock, sand, scraping over rails, pipe, concrete, etc. In all sizes and types—in cases or reels. Ask your dealer—or write for catalog.

I'LL TAKE THE WHITE ONE EVERY TIME!
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TRADE
3
WYTEFACE
STEVENS WYTEFACE "A"
KEUFFEL & ESSER CO.
GRADUATED IN INCHES OR TENTHS

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POSTWAR PROJECTS (Cont'd.)

New York—New York Central System, S. E. Armstrong, engr., 466 Lexington Ave., New York, grade crossing elimination at Cataract Springs, Case No. 4258, Royalton, Niagara Co. $257,500. Plans under way.

New York—New York Central System, S. E. Armstrong, engr., 466 Lexington Ave., New York, grade crossong elimination at Store Crossing, Case No. 5378, and Quick's Crossing, both Lewisboro. $271,800. Plans under way.

New York—New York Central System, S. E. Armstrong, engr., 466 Lexington Ave., New York, grade crossing elimination, Shawnee Rd., Case No. 5408, Cambria, Niagara Co., $179,200. Plans under way.

New York—New York Central System, S. E. Armstrong, engr., 466 Lexington Ave., New York, grade crossing elimination at Barrys, Case 5344, Farmington, Ontario Co. $279,800. Plans under way.

New York—Pennsylvania R. R. Broad St. Sta., Phila., Pa., J. L. Gressit, ch. engr., grade crossing eliminations at Indian Church Rd., Aurora Ave., Olean St., Case No. 6583, $330,000; at Ridge Rd., Case No. 4234, $176,200, above at West Seneca, Erie Co. Plans under way.

★ **N. Y., Babylon**—Long Island R. R. Co., C. E. Adams, ch. engr., Penna Sta., New York, grade crossing elimination at Little East Neck Rd., Case No. 6638, Litchfield Ave., Great E. Neck Rd., Case No. 7296, Carll, Sammis, Deer Pafk, and Cooper Aves. $2,140,000. Plans under way.

★ **N. Y., Ballston Spa**—Delaware & Hudson R. R. Corp., P. O. Ferris, ch. engr., foot of State St., Albany, grade crossing elimination at Middlebrook St., Case No. 6025, Milton Ave. N., Union, North Sts., Spicer's Crossing, East High St., Case No. 6627, Eastern Ave., Prospect St., Milton Ave. S., Pleasant Ave., Low, Bath and Science Sts. $1,230,000. Plans under way.

★ **N. Y., Batavia**—New York Central System, S. E. Armstrong, engr., 466 Lexington Ave., New York, grade crossing eliminations at Cedar St., Case No. 5936, Harvester St., Case No. 7685, S. Jackson St., Case No. 6500, Clifton Ave., Case No. 7686, Liberty, Swan, Ellicott, Jackson, Evans and Walnut Sts. $4,290,000. Plans under way.

★ **N. Y., Binghamton**—City, Washington Bridge, $400,000; Court St. underpass, $175,000. State Planning Aid funds allocated.

★ **N. Y., Buffalo**—New York Central System, S. E. Armstrong, engr., 466 Lexington Ave., New York, grade crossing elimination, Terrace Case No. 5472. $3,080,000. Plans under way.

★ **N. Y., Buffalo**—New York Central System, S. E. Armstrong, ch. engr., 466 Lexington Ave., New York, grade crossing elimination at Jersey St., Case No. 9058, $572,000. Design funds available.

★ **N. Y., Corning**—Erie R.R. Co., J. W. Smith, ch. engr., Midland Bldg., Cleveland, O., grade crossing elimination at city streets, Case No. 9418. $4,200,000. Design funds available.

★ **N. Y., East Rochester**—New York Central Sys., S. E. Armstrong, engr., 466 Lexington Ave., New York, grade crossing elimination, Washington St., Case No. 6014. $503,100. Plans complete.

★ **N. Y., Floral Park**—Long Island R.R. Co., C. E. Adams, ch. engr., Penna Sta., New York, grade crossing elimination at Carnation, Tulip and Plainfield Aves., Case No. 7277. $1,854,000. Plans under way.

★ **N. Y., Grant City (Staten Island)**—Staten Island Rapid Transit Ry. Co., C. M. Shriver, gen. mgr., 25 Bway., New York, Grant City-Bay Terrace grade crossing elimination, Richmond Co. $3,800,000. Plans under way.

N. Y., Hancock—Erie R.R. Co., J. W. Smith, ch. engr., Midland Bldg., Cleveland, O., grade crossing elimination, at Creamery Crossing, Case No. 9773. $100,000. Plans under way.

N. Y., Hastings—New York Central System, S. E. Armstrong, 466 Lexington Ave., New York, engr., M. W-Sys., grade crossing elimination, Jackson Ave., Case No. 4993. $310,000. Plans complete.

★ **N. Y., Hempstead**—Long Island R. R. Co., C. E. Adams, ch. engr., Penna Sta., New York, grade crossing eliminations at Wantagh Ave., Case No. 4670, Beach St., Case No. 7829, and Oakland Ave., Case No. 10189, $835,000, Plans complete; grade crossing elimination at Grand and Milburn Aves., Case No. 7278. $1,990,000, Plans under way.

N. Y., Henrietta—New York Central System, S. E. Armstrong, engr. 466 Lexington Ave., New York, grade crossing elimination, West Henrietta Rd., Case No. 5402. $188,700. Plans under way.

N. Y., Holland-Yorkshire — Pennsylvania R.R., J. L. Gressit, ch. engr., Broad St. Sta., Phila., Pa., reconstruction, grade crossing elimination, Hy. 5622. $300,000. Plans under way.

N. Y., Horseheads—Pennsylvania R.R., J. L. Gressitt, ch. engr., Broad St. Sta., Phila., grade crossing elimination at Chemung, Sayre and N. Main Sts., Case No. 5787. $388,214. Plans under way.

OSTWAR PROJECTS (Cont'd.)

N. Y., Ithaca—City, State St. bridge over ayuga Inlet, $50,000; bridge over Fall Creek, n Lake St., $30,000; reconstructing bridge ver Cascadella Creek, De Witt Pl., $20,000; ewart Ave. bridge over Cascadilla Park, 50,000; bridge over Six Mile Creek, Cayuga t., $30,000; bridge over Fall Park, Thurston ve., $75,000; bridge over Six Mile Creek, olumbus St., $75,000. State Planning Aid nds allocated.

N. Y., Jasper-Addison—Baltimore & Ohio .R. Sys., A. C. Clarke, ch. engr., Baltimore nd Charles Sts., Baltimore, Md., reconstruc- ion, grade crossing elimination, at Hy. 5349. 280,000. Plans under way.

N. Y., Johnson City—Delaware, Lackawanna Western R.R. Co., G. A. Phillips, ch. engr., assenger Terminal, Hoboken, N. J., grade rossing elimination, Baldwin St., Case No. 934. $225,000. Design funds available.

N. Y., Johnstown—Comrs. Fulton Co., Johns- own, 9 bridges on County System. $124,500. tate Planning Aid funds allocated.

★**N. Y., Kingston**—New York Central System, S. E. Armstrong, engr., 466 Lexington ve., New York, grade crossing elimination, way., Case No. 4781. $614,000. Plans complete.

★**N. Y., Lancaster**—New York Central System, S. E. Armstrong, engr., 466 Lexington ve., New York, Delaware, Lackawanna & estern R.R. Co., G. A. Phillips, ch. engr., assenger Terminal, Hoboken, N. J., Lehigh alley R.R. Co., R. E. Patterson, ch. engr., 25 Brighton St., Bethlehem, Pa., and Erie .R. Co.. J. W. Smith, ch. engr., Midland ldg., Cleveland, O., grade crossing elimina- ion, Central Ave., Case No. 5935. $950,000. lans complete.

N. Y., Little Neck—Long Island R.R. Co., E. Adams, ch. engr., Pennsylvania Station, ew York, grade crossing elimination, Little eck Pkwy., $400,000. Plans under way.

N. Y., Lockport—New York Central System, E. Armstrong, engr., 466 Lexington Ave., ew York, grade crossing elimination, Lock nd Gooding Sts., Case No. 7283. $264,300. lans under way.

N. Y., Manchester-Victor—Lehigh Valley .R. Co., R. E. Patterson, ch. engr., 425 righton St., Bethlehem, Pa., reconstruction, rade crossing elimination, Hy. 637. $200,000. lans complete.

★**N. Y., Maspeth (sta. Flushing)**—Long Island R.R. Co., C. E. Adams, ch. engr., enna. Sta., New York, grade crossing elmina- ion. $2,000,000. Design funds available.

N. Y., Menands (br. Albany)—Delaware & Hudson R.R. Corp., P. O. Ferris, ch. engr., oot State St., Albany, grade crossing elimina- ion, at Loudonville-Menands Hy., Case No. 0313. $200.000. Design funds available.

N. Y., Mendon—Lehigh Valley R.R. Co., R. E. Patterson, ch. engr., 425 Brighton St., Beth- hem, Pa., grade crossing elimination, at SH 493-SH 1187, Case No. 9212. $300,000. Design plans available.

N. Y., Middleport—New York Central System, S. E. Armstrong, engr., 46 Lexington Ave., New York, grade crossing elimination, Main St., Case No. 4720. $246,700. Plans under way.

★**N. Y., Mount Kisco**—New York Central System, S. E. Armstrong, engr., 466 Lexington Ave., New York, grade crossing eliminations at Main St., Case No. 4678, Lexington and South Sts., Hubbels Crossing, Case No. 5777. $1,350,800. Plans under way.

N. Y., Mt. Morris—Delaware, Lackawanna & Western R. R. Co., G. A. Phillips, ch. engr., Passenger Terminal, Hoboken, N. J., grade crossing elimination at Hy. 855, Case No. 10322. $220,000. Design funds available.

★**N. Y., Niagara Falls**—New York Central System, S. E. Armstrong, ch. engr.. 466 Lexington Ave., New York and Erie R.R. Co., J. W. Smith, ch. engr., Midland Bldg., Cleveland, O.. grade crossing elimination at city streets, Case No. 6607, $6,000,000. Design funds available.

N. Y., Niagara Falls—New York Central System, S. E. Armstrong, engr., 466 Lexington Ave., New York, grade crossing elimination at Military Rd., Case No. 5407. $150,000. Plans under way.

★**N. Y., North Tonawanda and Tonawanda**—Erie R. R. Co., J. W. Smith, ch. engr., Midland Bldg., Cleveland, O., and New York Central System, S. E. Armstrong, engr., 466 Lexington Ave., New York, grade crossing elimination at Goundry St., Case No. 4718, State St., Case No. 5387, Maple St., Young St., Oliver St., Case No. 5406, Fillmore Ave., Thompson, Schenk, Robinson, Sommer, and Wheatfield Sts. $3,200,000. Plans under way.

N. Y., Olean—Erie R.R. Co., J. W. Smith, ch. engr., Midland Bldg., Cleveland, O., grade crossing elimination, Buffalo St., Case No. 10315. $100,000. Design funds available.

★**N. Y., Oneida**—New York Central System, S. E. Armstrong, ch. engr., 466 Lexington Ave., New York, grade crossing elimination at city streets, Case No. 9941, $3,200,000. Design funds available.

N. Y., Oswego—Erie R. R. Co., J. W. Smith, ch. engr., Midland Bldg., Cleveland, O., grade crossing elimination North Ave., Case No. 7688; at Green St., Case No. 8145, McMaster and East Temple Sts., $445,785. Plans complete.

N. Y., Oswego—New York, Ontario & Western Ry. Co., F. J. Meyer, ch. engr., Middletown, reconstruction, grade crossing elimination E. Oneida St., Hy. 5487. $100,000. Plans complete.

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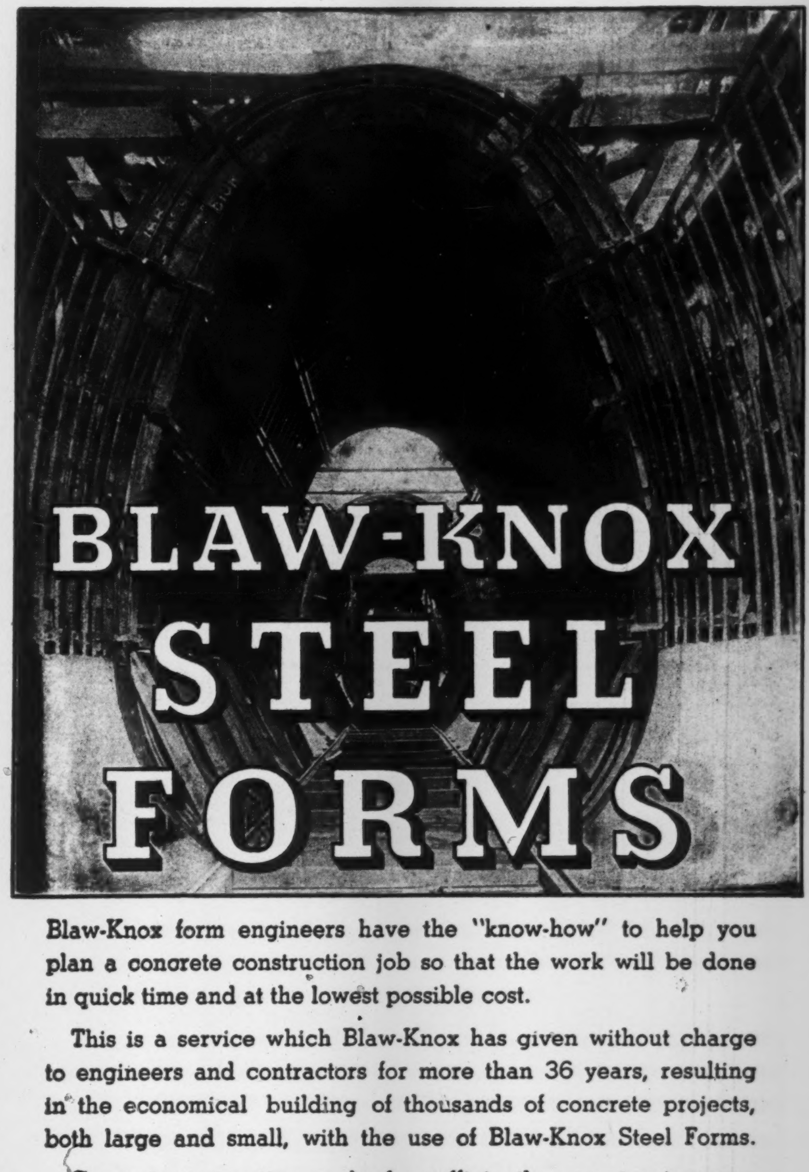

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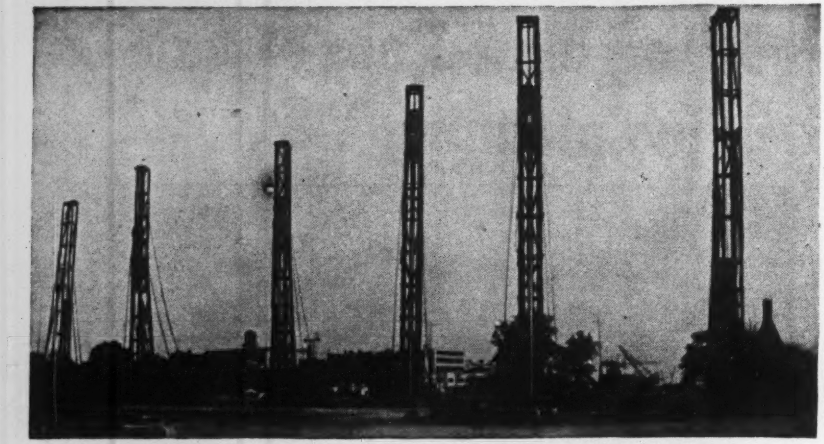

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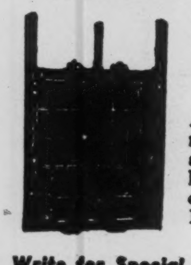

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POSTWAR PROJECTS (Cont'd.)

★**N. Y. Oyster Bay**—Long Island R.R. C
C. E. Adams, ch. engr., Pennsylvania S
tion, New York, grade crossing elimination
Village Sts., Case No. 10324, $1,200,000. Desi
funds available.

★**N. Y., Oyster Bay**—Long Island R. R. C
C. E. Adams, ch. engr., Penna Sta., N
York, grade crossing elimination Massapeq
Rd., Case No. 4671, $689,000. Plans comple

N. Y., Pattersonville—New York Centr
System, 466 Lexington Ave., New York, S.
Armstrong, engr. M. W.-Sys., grade crossi
elimination, Case No. 6630. $273,153. Pla
complete.

N. Y., Pavilion-Griegsville—Delaware, Lac
awanna & Western R.R. Co., G. A. Philli
ch. engr., Passenger Terminal, Hoboken, N.
reconstruction, grade crossing elimination, e
Hy. 1777. $140,000. Plans under way.

N. Y., Pawling—New York Central Syste
S. E. Armstrong, engr., 466 Lexington Av
New York, grade crossing elimination N. Ma
St., Case No. 5363. $144,200. Plans under wa

N. Y., Peeksville—New York Central Syste
S. E. Armstrong, ch. engr., 466 Lexington Av
New York, reconstruction, grade crossing elim
ination at Hy. 657. $280,000. Plans complet

N. Y., Pittsford—New York Central Syste
S. E. Armstrong, engr., 466 Lexington Av
New York, grade crossing elimination
Clover St., Case No. 6015. $116,200. Pla
under way.

★**N. Y., Plattsburg**—Delaware & Huds
R.R. Corp., P. O. Ferris, ch. engr., fo
State St., Albany, grade crossing eliminati
at city streets. Case No. 10318. $2,000,00
Design funds available.

★**N. Y., Pleasantville**—New York Centr
System, S. E. Armstrong, engr., 466 Le
ington Ave., New York, grade crossing elim
nation at Bedford Rd., Rebecca Ave., Case N
5942. $1,380,000. Plans under way.

N. Y., Potsdam—New York Central Syste
S. E. Armstrong, ch. engr., 466 Lexingto
Ave., New York, grade crossing eliminati
at Sissons Crossing, Case No. 6623, $144.30
Design funds available.

N. Y., Remsen-Boonville—New York Centr
System, S. E. Armstrong, ch. engr., 466 Le
ington Ave., New York, reconstruction grad
crossing elimination at Hy. 5346. $400,00
Plans under way.

★**N. Y., Rochester**—New York Central System, S. E. Armstrong, engr., 466 Lexingto
Ave., New York, grade crossing eliminatio
at Lyell Ave., Case No. 4762; Glide St., Cas
No. 5403, $550,000; New York Central System
S. E. Armstrong, engr., 466 Lexington Ave
New York and Baltimore & Ohio R. R. System, A. C. Clarke, ch. engr., Baltimore an
Charles Sts., Baltimore, Md., grade crossin
elimination at Ames, Hague, Colvin, Chil
and York Sts. $1,525,000. Plans under wa

★**N. Y., Rockville Centre**—Long Island R. R
Co., C. E. Adams, ch. engr., Penna Sta
New York, grade crossing elimination at Merrick and Long Beach Rds., Nassau, Banks
Center, Village, Park, Morris, Forrest an
Oceanside Aves., Case No 7276. $2,750,00
Plans complete.

★**N. Y., Saratoga Springs**—Delaware & Hudson R. R. Corp., P. O. Ferris, ch. engr.,
foot of State St., Albany, grade crossing elimination at city streets Case Nos. 6627 and 7027.
$2.611,000. Plans under way.

N. Y., Saugerties—New York Central System, S. E. Armstrong, ch. engr., 466 Lexingto
Ave., New York, reconstruction, grade crossing elimination. $300,000. Plans complete.

N. Y., Scotia—New York Central System. S.
E. Armstrong, ch. engr., 466 Lexington Ave.
New York, and Boston & Maine R.R., T. G.
Sughrue, ch. engr., 150 Causeway, Boston,
Mass., reconstruction, grade crossing elimination at Ballston Ave., Hy. 5496. $450,000
Plans under way.

N. Y., Seneca Falls—New York Central System, S. E. Armstrong, engr., 466 Lexington
Ave., New York, grade crossing eliminations
at Dumonts, Case No. 5959. $166,600. Plans
under way.

N. Y., Syracuse—New York Central System,
S. E. Armstrong, engr., 466 Lexington Ave.,
New York, and Delaware, Lackawanna &
Western R. R. Co., G. A. Phillips, ch. engr.,
Passenger Terminal, Hoboken, N. J., grade
crossing elimination at Hiawatha Blvd., Case
No. 10378. $323,330. Plans complete.

N. Y., Syracuse—New York Central System,
S. E. Armstrong, ch. engr., 466 Lexington Ave.,
New York, reconstruction, grade crossing elimination at James St. Hy. 9. $375,000. Plans
complete.

N. Y., Union—Erie R.R. Co., J. W. Smith,
ch. engr., Midland Bldg., Cleveland, O., grade
crossing elimination, Hooper Rd., Case No.
9790. $350,000. Design funds available.

N. Y., Valley Stream—Long Island R. R. Co.,
C. E. Adams, ch. engr., Penna Sta., New York,
grade crossing elimination at Central Ave.,
Case No. 5466. $381,500. Plans under way.

N. Y., Watertown—New York Central System, 466 Lexington Ave., New York, S. E.
Armstrong, engr. M. W.,-Sys., grade crossing
elimination, W. Main St., Case No. 6591.
$268,500. Plans under way.

N. Y., Watertown—New York Central System, S. E. Armstrong, ch. engr., 466 Lexington
Ave., New York, reconstruction, grade crossing
elimination at Hy. 5651. $250,000. Plans complete.

POSTWAR PROJECTS (Cont'd.)

N. Y., Westport—Delaware & Hudson R.R. Corp., P. O. Ferris, ch. engr., foot State St., Albany, grade crossing elimination at Vials Crossing, Case No. 10321. $140,000. Design funds available.

N. Y., Whitehall Corners-Wright Corners—New York Central System, S. E. Armstrong, ch. engr., 466 Lexington Ave., New York, reconstruction, grade crossing elimination at Hy. 1324. $130,000. Plans complete.

N. Y., Whitesboro—New York Central System, S. E. Armstrong, ch. engr., 466 Lexington Ave., New York, reconstruction, grade crossing elimination at Hy. 5325. $150,000. Plans under way.

N. Y., Wyatts-Hoffmans—New York Central System, S. E. Armstrong, ch. engr., 466 Lexington Ave., New York, reconstruction, grade crossing elimination at Hy. 5110. $350,000. Plans under way.

N. Y., Yorktown Heights—New York Central System, S. E. Armstrong, engr., 466 Lexington Ave., New York, grade crossing elimination at Croton Lake Station, Case No. 5380. $125,600. Plans under way.

★ **O., Akron**—City, grade crossing elimination, $2,978,000; new bridges, $329,000; bridge constr. and repair, $368,000. L. B. Heibel, City Hall, city engr.

★ **O., Cleveland**—City Planning Comn., City Hall, rebuilding bridges, Abbey St. between W. 14 and Lorain, $1,356,600; Canal Rd. over B. & O. R. R., $75,000; Detroit Ave. over N. Y. C. & St. L. R. R., $367,000; E 33 St. and Penn. R. R., $85,000; E. 34 St. over Kingsbury Run, $1,332,000. E. 68 St. over N. Y. C. & R. R., $280,000; new bridges, Big Creek, south of Clinton and W. Blvd., $32,000; Central viaduct, $3,064,800; E. 55 St. over W. & L. E. R. R., $630,000; Franklin Ave., over Nickel Plate R. R., $500,000; Sidaway Ave., over Valley between E. 65 and Kinsman Sts., $535,000; repairing bridges Center St. over River, $150,000; Clark Ave. viaduct, $100,000; Eagle Ave., $35,000; Fulton Rd., over Big Four R. R., $528,000; Jefferson Ave., over River, $100,000; Kinsman Rd., at Penn. R. R., $325,600; Main Ave. over Erie R. R., $45,000; Willow St. over River, $100,000; widening bridge E. 55 St. under N. Y. C. R. R., $110,000; W. 3 St., over N. Y. C. & Penn. R. R., $270,000; rebuilding approaches, E 152 St. over N. Y. C. R. R., $270,000; grade separation Bdwy. and Erie R. R., $745,000; Bdwy. and W. & L. E. R. R., $800,000; Brookpark Rd. and Big Four R. R., $568,000; Brookpark Rd. and N. Y. C. R. R., $560,000; Coit Rd. and N. Y. C. R. R., $565,000; East Blvd. and Erie R. R., $220,000; E. 26 St. and Lakefront Hy., $561,000; E. 26 St. and N. Y. C. R. R., $740,000; E. 26 St. & Penn. R. R., $772,000; E. 37 St. and Erie R. R., $685,000; E. 40 St. and Lakefront Hy., $742,000; E. 40 St. and N. Y. C. R. R., $735,000; E. 55 St. and Lakefront Hy., $798,000; E. 65 St. and Erie R. R., $425,000; E. 72 St. and N. Y. C. R. R., $922,000; E. 75 St. and W. & L. E. R. R, $415,000; E. 79 St. exten. under Erie R. R., $354,000; E. 93 St. and Erie & W. & L. E. R. R., $925,000; E. 131 and Miles Sts., $1,062,000; E. 116 St. and Erie R. R., $550,000; E. 143 St. and Erie R. R., $320,000; Eddy Rd. and N. Y. C. R. R., $500,000; Harvard Ave. and Erie R. R., $830,000; Harvard Ave. and W. & L. E. R. R., $202,000; Lakewood Hts. Blvd. and N. Y. C. R. R., $876,000; Miles Ave. and W. & L. E. R. R., $485,000; Puritas Ave. and N. Y. C. R. R., $425,000; Warner Rd. and Penn. R. R., $595,000; West Blvd. exten. under B. & O. R. R., $175,000; W. 61 St. and Big Four R. R., $220,000; W. 104 St. and Nickel Plate R. R., $450,000; W. 114 St. and Nickel Plate R. R., $450,000; W. 117 St. and Nickel Plate R. R., $430,000; W. 140 St. and N. Y. C. R. R., $375,000; Woodworth Ave & Nickel Plate R. R., $350,000; rebuilding grade separation W. 150 St. and N. Y. C. R. R., $325,000; constructing Kemper Rd. exten. to N. Park Blvd., $70,000; Stadium pedestrian bridge, north of underground exhibition hall, $1,605,000. City for Div. Engineering & Construction. Plans partially completed.

★ **O., Euclid (br. Cleveland)**—City, grade crossing elimination project. $500,000. F. A. Thomas, city engr.

★ **Pennsylvania**—State Hy. Dpt., Harrisburg, Elizabeth Bridge, $1,800,000.

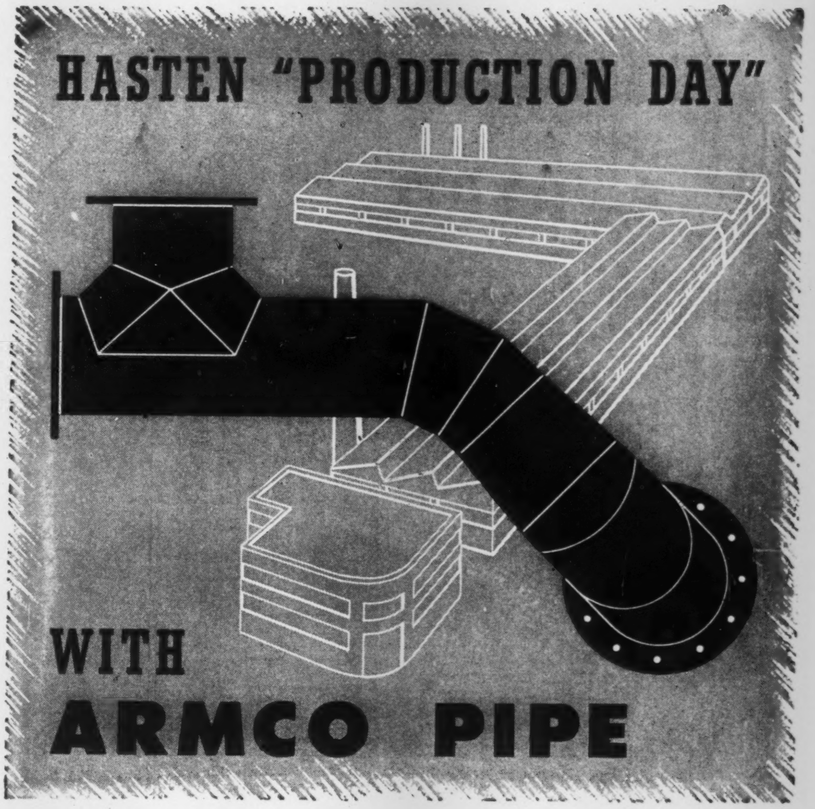
★ **Pa., Pittsburgh**—Allegheny Co., Pittsburgh, Rankin Bridge, $3,500,000; Dravosburg Bridge, $3,500,000; Natrona-Braeburn Bridge (joint with Westmoreland Co.), $1,000,000; grade separation, Liberty Tunnels-South End, $1,300,000; grade separation Liberty Tunnels, North End, $1,000,000; Fleming Park Bridge $1,000,000; Pittsburgh-North Side High Level bridge, $3,000,000; reconstructing 40 minor bridges, $1,000,000.

★ **Pa., Pittsburgh**—City, Point Park separation, $2,500,000; Pittsburgh-North Side High Level bridge, damage, etc., $500,000.

★ **Tex., San Antonio**—City, G. B. Mauermann, mayor, City, 7 rein.-con. bridges, $[illegible]90,000; 2 new underpasses, incl. another one under Missouri-Pacific tracks on W. Commerce St., $700,000. M. L. Diver, Riverside Bldg., and City Hall, engr. Thos. Coghill, City Hall, city engr.

ROADS

★ **New Jersey**—State Hy. Dpt., Trenton, constructing road connecting Routes 28 and 29 in Somerville and North Branch Somerset Co., $1,590,000; Route 25 from Cranbury to Hightstown, Middlesex and Mercer Counties, $660,000.



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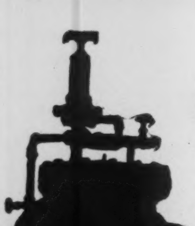

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POSTWAR PROJECTS (Cont'd.)

★ **N. J., Newark**—City, City Hall, street imprvs., repaving throughout city. $5,000,000. D. Coles, City Hall Annex, acting engr.

★ **New York**—Dpt. P. Wks., Bureau Hys., Albany, paving 1.95 mi. Bronx River Parkway from Magenta to E. 238 Sts., $410,000; grading, strcctures, separation of grades 0.6 mi. Bronx River Parkway at E. 233 St., $760,000; 0.24 mi. Bronz River Parkway at New York, New Haven & Hartford R. R. and East Tremont Ave., $400,000; 0.18 mi. Bronx River Parkway at E. 177 St., $255,000; grading, structures 1.33 mi. Bronx River Parkway from Magenta to E. 233 Sts., separation of grades at Green Hill Rd., $670,000; grading, structures 1.46 mi. Bronx River Parkway E. 180 St. to Allerton Ave., $615,000; grading, structures, paving 0.9 mi. Bronx River Parkway, Mosholu Parkway to Magenta St., separation of grades at Mosholu Parkway, $580,000, all foregoing Bronx Co.; grading, structures 5.2 mi. Northern State Parkway, Union Ave. to Sunnyside Blvd. Extension, $325,000; 3.8 mi. Northern State Parkway, Sunnyside Blvd. Extension to S.H. No. 794, $420,000, grading, structures 1.17 mi. Southern State Parkway, cutoff at Hempstead Lake, separation of grades at Eagle Ave., $500,000, all foregoing Nassau Co.; paving 2.1 mi. Southern State Parkway, from Gas Station to Deer Park Ave., separation of grades at Parking Field Entrance, Suffolk Co., $520,000, **plans complete**; 7 mi. Grand Island-West River Parkway, Buckhorn Island State Park to Beaver Island State Park, Niagara Co., $1,900,000; 22.6 mi. Lake Ontario State Parkway, Hamlin Beach State Park to Rochester, $4,600,000, Monroe Co.; altering Bronx River Parkway to Westchester Ave. "L" structure, $100,000; paving 1.46 mi. Bronx River Parkway from E. 180 St. to Allerton Ave., separation of grades at Pelham Parkway; paving 1.3 mi. Bronx River Parkway from Eastern Blvd. to 180 St., $290,000; grading structures 0.71 mi. Eastern Blvd. to Westchester Ave., separation of grades at Watson and Westchester Ave., $685,000; 0.36 mi. Bronx River Parkway E. 172 to 174 Sts., $495,000, all foregoing Bronx Co.; 10.7 mi. Bronx River Parkway, Midland Ave to Valhalla, $1,500,000; 2.7 mi. Bronx River Parkway, New York City Line to Midland Ave., $2,500,000; 2.5 mi. Saw Mill River Parkway, Bedford Hills to Katonah, $910,000; 2.9 mi. Saw Mill River Parkway, Mount Kisco to Bedford Hills, $1,030,000; 4.1 mi. Saw Mill River Parkway, Chappaqua to Mt. Kisco, $560,000, 0.6 mi. Cross County Parkway Extension, $500,000, all foregoing Westchester Co.; 25 mi. main roads in Allegany State Park, Cattaraugus Co., $400,000; 7.6 mi. Taconic State Parkway, Freedom Plains to Washington Hollow, grade 2 drives, pave 1 drive, $1,257,000; 4.3 mi. Taconic State Parkway, Washington Hollow to Clinton Corners, grade 2 drives, pave 1 drive, $1,089,000; 8.8 mi. Taconic State Parkway, Clinton Corners to Lafayetteville, grade 2 drives, pave 1 drive, $1,254,000, all Dutchess Co.; paving 2.9 mi. Northern State Parkway from Co. Line Rd. to old County Rd., $620,000; 6.7 mi. Northern State Parkway, traffic divider and imprv. access roads, Queens Co. line to Jericho turnpike, $225,000; paving 3.1 mi. Northern State Parkway from South Oyster Bay Rd. to County Line Rd., $645,000; 3.3 mi. Northern State Parkway from Union Ave. to South Oyster Bay Rd., $650,000; paving, reconstructing 2.96 mi. Southern State Parkway, cutoff at Hempstead Lake, $700,000; Southern State Parkway, traffic divider and imprv. access roads, Belt Parkway to Bway., Amityville, $500,000; grading, paving structures, parking field 0.5 mi., Ocean Parkway, $125,000, all foregoing Nassau Co., **plans under way.**

★ **O., Akron**—City, City Hall, street resurfacing $215,600; resurfacing, widening, $563,000; repaving $1,980,000; new street paving, $987,000. L. B. Heibel, City Hall, city engr.

★ **O., Cleveland**—City Planning Comn., City Hall, plans partially completed paving Central Ave. from E. 79 to east of E. 83 Sts. $40,200; E. 154 St. from Miles to Harvard Aves., $74,800; Fairfield Ave., from Scranton to W. 10 Sts., $64,000; Meech Ave. from E. 93 St. to E. 105 Pl., $60,200; University Rd., from Scranton Rd. to W. 14 St., $34,700; Wade Park Ave. from E. 86 to E. 118 Sts., $113,500; plans not yet started paving Abbey Ave. from W. 14 to Gehring Sts., $25,500; Aetna Rd. from E. 82 to E. 91 Sts., $46,000; Almira Ave. from W. 82 to W. 100 Sts., $46,700; Almira Ave. from W. 100 to W. 110 Sts., $31,800; Archmere Ave. from W. 35 to east of W. 45 Sts., $31,800; Ashwood Ave. from E. 132nd to E'ly. City Limits, $42,500; Berea Rd. from Lorain Ave. to W. 131 St., $42,100; Brysdale Ave. from Rocky R. Dr. to Harwell Ave., $41,500; Carnegie Ave. from E. 9 to E. 14 Sts., $45,500; Cedar Ave. from E. 65 to E. 89 Sts., $122,000; Cleveland Shoreway (N. Rdy.) from E'ly end of E. 9 St. underpass to approx. E. 70 St., $980,000; Continental Ave. from E. 111 to E. 121 Sts., $36,500; Denison Ave. from W. 25 St. to Jennings Ave., $95,000; East Blvd. from Cedar to Fairhill Aves., $62,000; E. 19 St. from Woodland to Scovill Aves., $28,000; E. 21 St. from Euclid to St. Clair Aves., $80,000; E. 22 St. from Prospect to Cedar Aves., $29,000; E. 26 St. from St. Clair to Superior Aves., $27,000; E. 30 St. from Euclid to Perkins Aves., $40,500; E. 53 St. from St. Clair to Superior Aves., $31,000; E. 55 St. from Homer to Superior Aves., $28,000; E. 55 St. from Scovill to Central
Aves., $47,000; E. 62 St. from St. Clair
N'ly,. $26,000; E. 63 St. from St. Clair Av
N'ly. end, $45,000; E. 65 St. from Superi
Hough Aves., $99,200; E. 66 St. from Sup
to Wade Park Aves., $29,900; E. 71 St.
Broadway to Lansing Aves., $72,000; E
St. from Superior to St. Clair Aves., $99
E. 79 St. from St. Clair to Broad A
$59,000; E. 82 St. from St. Clair to B
Aves., $59,000; E. 86 St. from Cedar to Qu
Aves., $54,000; E. 99 St. from Superio
Adams Aves., $37,000; E. 118 St. from W
Park to Euclid Aves., $50,000; E. 131 St.
Coit to St. Clair Aves., $83,000; E. 132
from Shaker Sq. to Griffing Ave., $160,000
136 St. from Svec to Crennel Aves., $60
E. 146 St. from Caine to Velma Aves., $27
E. 152 St. from St. Clair Ave. to N. Y. C. R
Bridge, $122,000; Elmwood Ave. from W.
St. to Berea Rd., $52,500; Fulton Rd.
Biddulph to Memphis Aves., $135,000; Ha
Ave. from Doloff Ave. to E. 49 St., $45,
Kinsman Rd. from E. 55 St. east of E. 82
$141,000; Lansing Ave. from E. 71 to E
Sts., $90,000; Lorain Ave. from Rocky R.
to Riveredge Ave., $62,000; Main St.
River Rd. to W. 25 St., $91,500; Mayfield
from south of E. 115 St. to North of Colt
Ave., $42,000; Muriel Ave. from E. 35 St
W. 45 Pl., $35,000; Norwood Rd. from
Clair to Superior Aves., $45,000; Orchardh
Ave. from Rocky R. Dr. to W. 202 St., $47,
Parkview Ave. from E. Blvd. to E. 116
$26,000; Pershing Ave. from Clark-Pers
Bridge to E. 49 St., $39,000; Professor
from Fairfield to Starkweather Aves., $83,
Prospect Ave. from E. 9 to E. 22 Sts., $153,
Randall Rd. from Lorain Ave. to W. 44
$43,000; San Diego Ave. from W. 134 to
140 Sts., $31,000; Sandusky Ave. from E
to E. 110 Sts., $31,000; Scoville Ave. f
E. 26 to E. 55 Sts., $98,000; Scranton Rd. f
Clark to Parafine Aves., $154,000; Starkwea
Ave. from W. 7 to W. 10 Sts., $39,000; T
man Ave. from W. 58 to W. 45 Sts., $73,
Track Rd. from E. 55 St. to Nursery A
$54,000; W. 7 St. from Railway to Mary A
$104,500; W. 10 St. from Railway to St
weather Aves., $99,000; W. 11 St. from Sch
to Spring Aves., $99,000; W. 14 St. f
Kenilworth to Clark Aves., $167,000; W. 28
from Bridge to Lorain Aves., $52,000; W.
St. from Woodbine to Detroit Aves., $48,
W. 38 St. from Fulton to Franklin Av
$58,000; W. 58 St. from Lorain to Walw
Aves., $42,000; W. 196 St. from Brookpark
Maplewood Aves., $38,000; plans not yet p
pared street widenings Ansel, Broadv
Coit, Grayton, Pearl, Turney, Valley and W
ner Rds., Auburn, Bridge, Chatham, Colg
Denison, Detroit, Drake, Durant, Euclid, G
ring, Grant, Hamilton, Hanks, Hough, La
Lorain, Memphis, McBride, Miles, Mon
Orville, Rockport, Sackett, Seager, W
Park, Walton, Western, Willard and Wo
land Aves., E. 4, E. 21, E. 37, E. 54, E.
E. 77, E. 79, E. 93, E. 105, E. 107, E.
E. 121, E. 125, E. 131, E. 132, E. 140, W.
W. 11, W. 24, W. 25, W. 28, W. 34, W.
and W. 58 Sts.; Broadway, Franklin, La
wood Heights and North Morland Blvd
Reserve and Theurer Courts, City for D
Engineering & Construction.

★ **O., Dayton**—City, street imprv. and c
struction, incl. sidewalks, curbs, str
signs, traffic control and alley. $4,000,0
G. F. Baker, city engr.

★ **Pennsylvania**—State Hy. Dpt., Harrisbu
constructing Saw Mill Run Blvd. (W
End), $625,000; east part, Pitt Parkw
$15,500,000; west part, Pitt Parkw
$11,500,000; Sharpsburg-Etna Hy. (Route
70), $2,900,000; Ohio River Blvd., Ed
worth to Beaver Co. line, $300,000; Route
$1,200,000; Route 48, $750,000; Route
Tarentum to County Line (widening to
lanes), $250,000; Route 19, Wexford
County Line (widening to 4 lanes), $300,0
Route 88 (General Logan Blvd.), $850,0
Route 802 (Woodville Crossing), $475,0
Separation, Routes Nos. 51 and 31, $250,0

★ **Pa., Pittsburgh**—Allegheny Co., Pi
burgh, constructing Sect. 4, McKni
Rd., $700,000; Noblestown Rd., $1,000,0
Wildwood Rd., $600,000; Glass Run R
$250,000; Little Deer Creek Valley R
$1,000,000; Moon-Clinton Rd. $500,000; C
nection Route 19 to Ohio River Blvd. (W
View), $850,000; Middle Three Degree R
(Unpaved portion), $200,000; Renzie R
$100,000; Greensburg Pike, $300,000; Low
Run and Rochester Rd., $900,000; Irvin Wo
Rd., $800,000; Streets Run Road, $400,0
Peebles School Rd. (to North Park), $400,0
Babcock Blvd. (north of North Par
$400,000; Cochran Mills Rd., $250,000; Bet
Rd. (curve elimination, Bethel Chur
$50,000; Clairton Connection to Route
51, $150,000; Elkhorn and Elizabeth Rd.
Lock No. 3), $50,000; Industry Rd., $100,0
sections of Beaver Grade Rd. (4 mi.), $200,0
McKees Rocks and Forest Grove Rd., $200,0
Thompson Run Rd. (1 mi.), $150,000; Cre
ton and Russelton Rd., $400,000; 2 mi. se
of Turtle Creek-Monroeville Rd., $200,000;
mi. sects. Wilmerding-Monroeville R
$150,000; relocation 1¾ mi. New Texas R
$150,000; Lowries Run and Rochester Rd.
Route 19, $70,000; Evergreen and Low
Run Rd. at Route 19, $100,000; curve red
tions and realignment, various second
roads, $3,000,000.

★ **Pa., Pittsburgh**—City, Crosstown Th
fare, $7,500,000; Crosstown-Water St. c
nection, $2,000,000; Ohio River Blvd. Ext
east of Marshall Ave., $3,500,000.

POSTWAR PROJECTS (Cont'd.)

★**Texas**—State Hy. Dpt., Austin, and City of Houston, link in proposed Houston-Galveston new super hy., starting in heart of downtown Houston, going to south Houston, incl. main artery and network of connecting streets. $9,319,000.

★**B. C., Saanich**—City Councillors, City Hall, road imprvs., incl. 9 mi. primary hys., 62 mi. secondary hys., 50 mi. streets widened, imprvs., $568,145.

★**B. C., Vancouver**—Municipality, scenic drive from Stanley Park causeway around the Park to Marine Dr., along the Fraser River to Port Moody and around Burrard inlet again to Stanley Park. $700,000. Parks' Bd., City Hall, engr.

★**N. S., Halifax**—Municipality, street paving. $1,000,000.

★**Ont., Cobourg**—Durham Co., E. L. MacNachtan, clk., Cobourg, road construction. $1,000,000. A. S. Miller, County Bldg., engr.

EARTHWORK—IRRIGATION DRAINAGE—WATERWAYS

★**Ia., Red Rock**—U. S. Eng., Clock Tower Bldg., Rock Island, Ill., constructing dam across Des Moines River. $15,000,000.

★**Me., Portland**—State, Rivers & Harbors Comn., State House, Augusta, dredging Portland Harbor. $780,000.

★**Nevada**—State, Heroes Memorial Bldg., Carson City, North Fork Reservoir on Humboldt River, storing 75,900 acre-ft. water, $1,288,500; South Fork Reservoir, storing 60,900 acre-ft. water, $913,000; constructing 48 regulatory steel-concrete dams in Humboldt River, $720,000; stream and channel imprvs. along Little Humboldt River, $25,000; constructing flood control reservoir on Martin Creek, in Hardscrabble area, $136,000; enlarging channel of Truckee River between Lake Tahoe and Donner Creek, incl. 1,860,000 acre-ft. reservoir in Lemmon Valley; reservoir on West Walker River, covering 1,600 acres, storing 60,000 acre-ft. water; constructing dam storing 3,500 acre-ft. water at White Narrows sect. of Muddy River, $100,000; 35,000 acre-ft. reservoir in Double Canyon Sect. as flood control project, $150,000; Pine Canyon Dam, $100,000; Mathews Canyon Dam, $125,000; Delmues Dam, incl. rerouting Union Pacific R.R. tracks, $375,000; enlarging Muddy River Channel in vicinity of Caliente, $25,000.

★**N. Y. Rochester**—Comrs. Monroe Co. Rochester, channel imprvs. $954,000. State Planning Aid funds allocated.

★**O., Cleveland**—City Planning Comn., City Hall, plans not yet started erosion control, where needed from W. 117 to W. Blvd., E. 72 to E. 185 Sts. excluding Bratenahl, $400,000. plans partially completed Central Viaduct, pier removal and bulkhead constr., $80,000; Cut 4-B, land purchase and bulkhead constr., $1,410,000; Low Level Main Ave. bridge, pier protection, $50,000, City, for Div. Engineering & Construction.

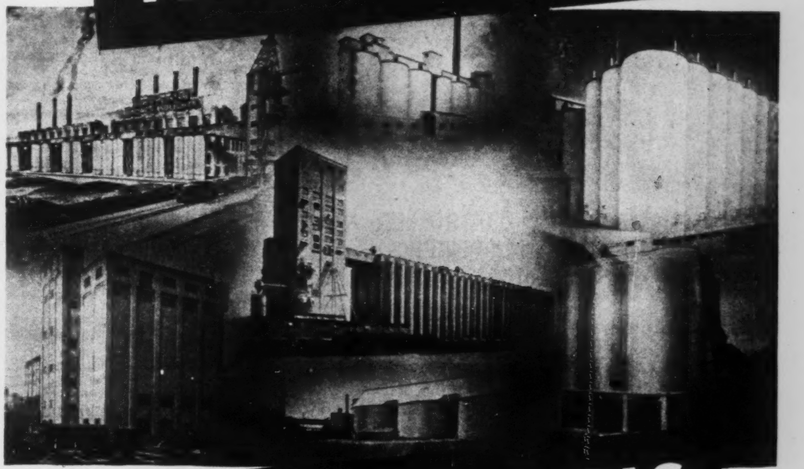
UNCLASSIFIED

★**N. J., Newark**—PARK IMPROVEMENTS, etc.—City, City Hall, imprvs., renovations to public parks, playgrounds and pools. $900,000. D. Coles, City Hall Annex, acting engr.

★**O., Cleveland**—AIRPORT FACILITIES—City Planning Comn., City Hall, airport facilities, incl. freight and truck terminal, $265,000; landing mats, runways, $1,590,000; landscaping, $265,000; passenger terminal, $2,120,000; shop and garage, $106,000; City for Div. Airport.

★**O., Cleveland**—BATH HOUSE, etc.—City Planning Comn., City Hall, plans completed White City bath house $129,000, plans partially completed Putnam playground $130,430, Sowinski playground $67,639, Worthington Park playground $272,920, plans not yet started bath houses and swimming pools, Garfield Park $159,000; Glenview Park $159,000, playfields, Ward 2 $527,810, Ward 5 $789,812, Ward 7, $385,575, Ward 9 $416,400, Ward 11, $420,730, Ward 13, $538,390, Ward 14, $506,794, Ward 22, $1,018,974, Ward 30, $531,764, Ward 33, $302,200, playgrounds Ward 1, $108,926, Ward 3, $55,850, Ward 4, $52,490, Ward 6, $40,430, Ward 8, $81,860, Ward 10, $71,230, Ward 12, $119,780, Ward 15, $50,300, Ward 16, $64,260, Ward 17, $78,820, Ward 19, $60,160, Ward 20, $286,070, Ward 21, $50,910, Ward 23, $80,500, Ward 24, $78,270, Ward 25, $71,620, Ward 26, $46,290, Ward 28, $56,930, Ward 29, $74,500, Ward 32, $67,470; playground comfort station (Cameron, Kelley-Perkins, Sterling, Superior, Luther, Train, Trent, Warsaw, $59,360, Seneca Golf Course $121,000, City for Div. Recreation; public stadium general rehabilitation, $106,000, City for Div. Stadium and Auditorium; plans partially completed lighting, replacement Garfield Park $32,000, plans not yet started Main Ave. bridge and railroad crossings $33,000, modernization various residential streets, $2,308,150, modernization various streets, blvds., drives, thoroughfares, traffic arteries $1,470,500, transition to municipal light sys., various streets, $1,810,750, City for Bureau of Street Lighting; plans partially completed underground cables and fire alarm boxes $350,902, City for Div. of Fire.

NICHOLSON



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★

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POSTWAR PROJECTS (Cont'd.)

★**O., Dayton**—PLAYGROUND, etc.—City, playground and park imprvs., incl. construction municipal rifle range. $2,625,000. G. F. Baker, city engr.

★**Pa., Pittsburgh**—AIRPORT, etc.—Allegheny Co., Pittsburgh, New Moon Township Airport, terminal facilities and access drives (no hangars), $600,000; county parks, $500,000; Soldier's and Sailors Memorial Cemetery, $500,000.

★**Sask., Fort a la Corne**—POWER DEVELOPMENT — Province of Saskatchewan, Regina, power development. $19,000,000. Sask. Power Com., Parliament Bldg., Regina, engrs.

PUBLIC BUILDINGS

★**Calif., Oakland**—City, 3 community centers, $375,000; stadium and athletic field, $375,000.

★**Ind., Evansville**—Bd. School Trustees, J. F. Wynn, chn., 200 N.W. 7 St., high school, North Side, Diamond Ave., Wedeking and Bedford Ave. $875,000; Reitz High School addn. $325,000; Lincoln High School addn., $225,000; 3 schools, incl. Wertz, Chestnut—Walnut, Howard Roosa schools, $175,000 ea.; Baker School, $275,000. Emma Roach School, $150,000.

★**Minn., Jackson**—C. H. Peterson, aud. Jackson Co., new court house, $500,000.

★**N. J., Newark**—City, City Hall, 2 high school and 2 grammar school bldgs. $5,000,000. D. Coles, City Hall Annex, acting engr.

N. J., Newark—City, City Hall, health department bldg. $450,000. D. Coles, City Hall Annex, acting engr.

★**N. J., Newark**—City, City Hall, nurse's home at City Hospital, $500,000. D. Coles, City Hall Annex, acting engr. CD 11/24—ENR 12/2, under Public Bldgs.

★**N. J., Nutley**—Tri-Town Association, Nutley Town Hall, Nutley, hospital serving Bloomfield, Nutley and Belleville, $2,000,000.

★**O., Berea**—Berea Bd. Educ., Mrs. Pritchard, clk., new high school and addn. to Central School, $500,000.

★**O., Cleveland**—City Planning Comn., City Hall, plans completed Fire Station 41, E. 116 St. and Malba Ave. $17,500, Fire Station 42, Pearl Rd. and Stickny Ave. $169,000, plans partially completed Fire Station 17, vicinity of E. 55 St. and Chester Ave. $211,500, 13 new fire stations, various sites, $2,150,500; headquarters bldg., vicinity 18 St. and Superior Ave. $2,182,500, City for Div. Fire; Lake Rd. generating station exten., Lake Rd. between E. 49 and E. 53 Sts. $8,000,000, main office bldg., downtown in vicinity of city hall or auditorium $575,000, plans not yet started bldg., W. 41 St. yard on Buckley Ave., $350,000, City for Div. Light & Power; new central market $1,693,000, West Side Market, refrigeration, rehabilitation $371,000, City for Div. Markets; plans partially completed Cesco Ave. garage, service units $162,000, Cesco Ave. garage, storage bldg. $159,000, garage addn. E. 24 St. and St. Clair Ave., $102,235, motor maintenance bldg. W. 3 St. and Clark Ave. $790,000, plans not yet started bldg., Dell Ave. and E. 74 St. $219,000, Leur Ave. storage bldg. $78,750, City for Div. Motor Vehicle Maintenance; plans partially completed Central Station imprvs. $1,248,000, E. 19 St. garage $543,500, plans not yet started broadcasting station $228,250, central training school and pistol range E. 9 and Payne Ave. $428,000, 4 District headquarters stations $3,235,000, E. 49 St. paint shop, vicinity of E. 49 and St. Clair Ave., $369,750, Hamilton Ave. Repair shop, E. 49 St. and Hamilton Ave., $85,000, City for Div. Police; plans partially completed 4 cottages, Hudson Boy's Farm $315,000 Educational bldg., Blossom Hill, $400,000, school auditorium, gymnasium, Hudson Boy's Farm $563,550, new correction farm $2,190,000, City for Div. Welfare Institutions, plans not yet started rehabilitation community centers, (Broadway, Central, Clark, Lincoln, Portland-Outhwaite, St. Clair, Woodland) $1,325,000, City for Div. Recreation; public hall general rehabilitation $159,000, City for Div. Stadium and Auditorium; asphalt truck garage and office, W. 3 St. and Clark Ave. $100,815, main supply yard and office bldg., W. 130 St. south of N. Y. C. R.R. $219,000, salt storage bldg. W. 3 St. and Clark Ave. $46,425, City for Div. Streets; motor coach operating stations, Cedar Ave. and Fairhill Rd. $397,500, 4271 Pearl Rd. $333,500, 12900 St. Clair Ave. $355,500, Superior Ave. and Lakeview Rd. $387,000, 1614 W. 117 St. $381,500, City for Transit System; central repair storage yard, vicinity of Pershing Ave. and W. 3 St. $400,000, City for Div. Water & Heat; plans partially completed hospital bldgs., incl. Colahan Bldg., pharmacy units and wings, Out-Patient Dpt. bldg. $920,000, and General bldg., porch enclosures $84,200, plans not yet started boiler house remodeling $73,600, general rehabilitation $795,000, ground imprvs. $106,000, nurses school $415,750, addn., remodeling old contagious bldg. $328,000, demolition power house $773,000, service bldg. $219,000, City for Div. City Hospital.

O., East Palestine—City, imprv. municipal light and WW plant, $125,000. F. S. Barckhoff, city engr.

★**Pa., Norristown**—Pa. Welfare Dpt., Ha risburg, ward bldg. at Norristown Sta Hospital, $2,061,500.

★**Pa., Pittsburgh**—Allegheny Co., Pittsburg new work-house and prison, $[illegible],000,000.

★**Tenn., Memphis** — State Tuberculos Comn., Nashville, tuberculosis hospita $1,300,000.

Wis., Neenah—Bd. Educ., senior high scho addn. $260,000. Foeller, Schober, Berner Safford & John, 310 Pine St., Green Ba archts.

★**Alta., Edmonton**—Province of Albert E. C. Manning, premier, 10,000 dwelling on farms; rebuilding or remodelling abou 20,000 farm homes providing proper water an sewer facilities, $100,000,000; constructin 3 Provincial Agricultural Schools about $250 000 ea.

★**Ont., Toronto**—Bd. Educ., C. H. R. Fulle bus. administrator, plans by C. E. Dyson, 155 College St., major imprvs., an construction Toronto schools and collegiate incl. new bldg., replacing Wellesley Scho and Ryerson main bldg., addns. to Rose Av and Dufferin Schools, remodeling Earlscour School, etc., $10,000,000.

★**Sask., Regina**—Provincial Govt., c/o Min istry of Education, plans by Dpt. Pu Wks., Parliament Bldg., 20 residential far schools. $5,000,000.

COMMERCIAL BUILDINGS

★**O., Cleveland**—F. W. Woolworth Co., T. E Owens, in charge construction, Leade Bldg., 2 story, bsmnt., department store bldg E. 2 St. and Euclid Ave. $750,000.

★**O., Oberlin**—Bd. Trustees Oberlin College E. H. Wilkens, pres., plans by Shreve Lamb & Harmon, 11 E. 44 St., New York 17, N. Y., auditorium and Little Theatre $1,800,000.

INDUSTRIAL BUILDINGS

★**Illinois**—PLANT, etc.—International Har vester Co., 180 N. Michigan Ave., Chicago purchased 375-acre site for 1 story, brick reinforced, farm machinery mfg. plant, incl foundry, forge shop, machine shop and ware house, east bank Mississippi River betwee Alton and Woodriver, Madison Co. $1,000,000

DRILLING CONTRACTORS
DIAMOND AND SHOT CORE BORINGS—DRY SAMPLE BORINGS

●

Foundation Testing for Bridges, Dams and All Heavy Structures

Also

Manufacturers of Diamond and Shot Core Drills, Accessories and Equipment

●

SPRAGUE & HENWOOD, Inc.
SCRANTON, PA. Dept. E U. S. A.

Fast, Dependable
SHOVELS, CRANES
DRAGLINES, BACK HOES
Crawler or Truck—Gas or Diesel
10 Models of 3/4-5/8-1/2-3/8 cu. yd.

THE BYERS MACHINE COMPANY
RAVENNA, OHIO
DISTRIBUTORS THROUGHOUT THE WORLD

THE MOST FOR THE MONEY
SPEED - EFFICIENCY - ECONOMY
CONSTRUCTION BY CONTRACT
THE ASSOCIATED GENERAL CONTRACTORS OF AMERICA, INC. · MUNSEY BLDG., WASH D.C.

OFFICIAL PROPOSAL

Bids: January 13, 1944 (209)

Construction of Sewers

HIGHWAY COMMITTEE OF THE CITY OF BRIDGEPORT, CONNECTICUT

Sealed bids for Contract No. Eight, Federal Works Agency, Project No. Conn. 6-107 for the construction of a double inverted sewage siphon and appurtenances under Yellow Mill Pond 130 feet north of and parallel to the North street line of Stratford Avenue, will be received by Fred Schwarzkopf, Clerk of the Highway Committee of the City of Bridgeport, Connecticut, until Thursday 2 P. M. (E. W. T.), January 13, 1944, and then at said office publicly opened and read aloud.

The Information for Bidders, Form of Bid, Form of Contract, Plans, Specifications and Performance Bond may be examined at said office and copies thereof obtained upon payment of $10.00 for each set. Any bidder, upon returning such set promptly and in good condition, will be refunded his payment, and any non-bidder upon so returning such a set will be refunded $5.00.

The Highway Committee of the City of Bridgeport reserves the right to waive any informalities in or to reject any or all bids.

Each bidder must deposit with his bid, security in the amount of 10% of the amount of the bid in the form and subject to the conditions provided in the Information for Bidders.

Attention of Bidders is particularly called to the requirements as to conditions of employment to be observed and minimum wage rates to be paid under the Contract.

No bidder may withdraw his bid within 45 days after date of the opening thereof.

FRED SCHWARZKOPF,
Clerk of the Highway Committee
of the City of Bridgeport,
Connecticut.

Address: City Hall, Bridgeport, Conn.
December 23, 1943.

Bids: January 12, 1944 (210)

Sanitary Sewer

War Public Works Project No. N. Y. 30-250
City of Geneva, New York,
(Board of Public Works)

Separate sealed bids for a Twelve inch (12") sanitary sewer for East North Street from Herbert Street easterly to Sweeney Ave. will be received by the Board of Public Works at its office in the City Hall until 10 o'clock A. M., Wednesday, January 12, 1944, and then at said Board's office, publicly opened and read aloud.

The information for Bidders, Form of Bid, Form of Contract, Plans, Specifications, and Forms of Bid Bond and Performance Bond may be examined at said office and copies thereof obtained upon payment of $10.00 for each set. Any bidder, upon returning such set promptly and in good condition, will be refunded his payment, and any non-bidder upon so returning such a set will be refunded $10.00.

The City of Geneva, N. Y., (Board of Public Works) reserves the right to waive any informalities in or to reject any or all bids.

Each bidder must deposit with his bid security in the amount of 5% of his bid in the form and subject to the conditions provided in the "Information for Bidders."

Attention of bidders is particularly called to the requirements as to conditions of employment to be observed and minimum wage rates to be paid under the contract.

No bidder may withdraw his bid within 30 days after the actual date of the opening thereof.

BOARD OF PUBLIC WORKS
J. W. Brennan
Superintendent.
December 23, 1943

WHERE TO BUY

Featuring additional products, specialties, and services for the Construction Industry

IMMEDIATE DELIVERY
With "Preference Rating"
UNIVERSAL Level - Transit
Telescope 12" long, 25 Power—Horizontal Circle 4½" with vernier to 5 minutes—Vertical Arc 3"—Instrument weighs 11 pounds, tripod 9 pounds.
Price complete with Tripod, Carrying Case, Sunshade, and Dust Cap $115.00. Can be furnished with a compass at $12.50 extra.
ORDER BY MAIL
Expert Repairing of All Makes of Instruments
FREE INTERESTING BOOK—"HOW TO LAYOUT BUILDING LOTS"—FREE—WRITE TODAY
DAVID WHITE COMPANY
305 W. Court Street
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TERRY ENGINEERING COMPANY
STEEL ERECTORS
BRIDGES - TOWERS - BUILDINGS
TANKS AND WELDING
103 Park Avenue
New York, N. Y.
MUrrayHill 5-0166
Colorado Bldg.
Washington, D. C.
MEtropolitan 2028

STEEL ERECTING • RIGGING
MACHINERY MOVING
20 CRANES — 60 TRUCKS
12 HEAVY DUTY TRAILERS
ROGER SHERMAN TRANSFER CO.
Hartford, Conn.
Tel: 8-4153; 8-0569

This
WHERE TO BUY
Section

supplements other advertising in this issue with these additional announcements of products and services essential to efficient and economical operation in the construction industry. Make a habit of checking this page, each issue.

DEPARTMENTAL STAFF
ENGINEERING
NEWS-RECORD

Let Us Write Your Contract Bonds
Agents From Coast to Coast
THE ÆTNA CASUALTY and SURETY COMPANY
HARTFORD CONNECTICUT

SEARCHLIGHT SECTION

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

UNDISPLAYED RATE:

10 cents a word, minimum charge $2.00. POSITIONS WANTED (full or part-time individual salaried employment only). ½ the above rates, payable in advance. (See ¶ or box Numbers.)

PROPOSALS, 50 cents a line an insertion.

INFORMATION:

BOX NUMBERS in care of any of our New York, Chicago or San Francisco offices count 10 words additional in undisplayed ads.

DISCOUNT of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

The advertising, rate is 6.90 per inch for advertising appearing on other than a c tract basis. Contract rates quoted on reque

AN ADVERTISING INCH is measured ⅞ in vertically on one column, 3 columns—30 inc —to a page.

E.N.

NEW ADVERTISEMENTS received by January 7th appear in January 13th issue subject to limitation of space available.

HELP WANTED

Structural Steel Designer for large southern fabricating plant, experienced in riveted and welded design. Must be capable of developing new designs and have cooperative spirit. State salary expected and give three references.

P-68, Engineering News-Record
330 West 42nd St., New York 18, N. Y.

POSITIONS VACANT

These Positions Vacant advertisements are published subject to agreement by the advertisers not to consider applicants now employed on war work unless they obtain written release from present employer.

REINFORCING BAR Detailer & Draftsman. Location Southeast, with company operating over 4 states. Working conditions are good and living conditions average. Write stating experience, age, salary desired and small snapshot. P-61, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

MECHANICAL ENGINEER—Diecasting Engineer wanted. Excellent opportunity for permanent position with large established diecasting company for graduate mechanical or metallurgical engineer with diecasting experience. State qualifications and salary desired. Information given will be confidential and no inquiries made without consent. P-83, Engineering News-Record, 520 N. Michigan Ave., Chicago 11, Ill.

EMPLOYMENT AGENCIES

ENGINEERS — Mechanical—Industrial—Electrical—Chemical—Civil—Architectural, etc. Our specialized service to Technical and Scientific men only, for over 50 years, continuously at the same address, enables us to offer a fine selection of positions for high grade Manufacturing Executives, Production Managers, Metallurgists and Technical men of all types. The Engineering Agency, Inc., 53 W. Jackson Blvd., Chicago 4, Ill.

WANTED: Executive Engineers, Designers, Draftsmen, Teachers, Salesmen. Write us if available. Cleveland Engineering Agency, 2132 East Ninth Street, Cleveland, Ohio.

POSITIONS WANTED

CONSTRUCTION SUPERINTENDENT with over twenty-five years experience on all kinds of work including defense housing now available, will leave town. Well recommended, good executive not afraid of hard work. Take complete charge or assist general superintendent. PW-42, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

CONSTRUCTION SUPERINTENDENT, 44, considered amongst the best with excellent record of completions. Twenty years experience waterfront projects, difficult wet foundations, bridges, varied heavy concrete and steel structures. Projects of complicated detail no barrier. PW-78, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

SALARIED POSITIONS

This advertising service of 34 years' recognized standing negotiates for high salaried supervisory, technical and executive positions. Procedure will be individualized to your personal requirements and will not conflict with Manpower Commission. Retaining fee protected by refund provision. Identity covered and present position protected. Send for details.

R. W. BIXBY, INC.
272 Delward Bldg., Buffalo, N. Y.

A COURSE OF INSTRUCTION BY MAIL IN

STRUCTURAL ENGINEERING

Thirty-third Year

(In the following list, Courses A, B, and C are abbreviated from our complete Structural Engineering course).

- **A—Public Works Structures.**
- **B—Architectural Engineering.**
- **C—Special Course (State Board Exams, for P.E.)**
- **D—Structural Engineering (complete).**
- **E—Preparatory Course (for non-technical men).**

Our Courses are offered principally to
ADULT CIVIL ENGINEERS AND ARCHITECTS

Ninety percent of our engineering students are former graduates (C.E.) from engineering colleges. Our courses have helped thousands of engineers to better positions, increased pay, and success "after forty".

Course B has helped many architects and draftsmen in passing the structural portion of State Board Examinations for license.

Literature sent without expense or obligation. **Write TODAY.**

WILSON ENGINEERING CORPORATION
College House Offices Harvard Square Cambridge, Mass., U. S. A.

DRAFTING-DESIGN

Architectural, Aeronautical, Mechanical, Electrical, Piping, Ship, Topographical, Structural, Blueprint Reading, MATHEMATICS, Building Construction, Architect's, Surveyor's Engineer's Licenses.

MONDELL INSTITUTE
230 W. 41st N. Y. WI 7-2086. State Lic'd.

POSITIONS WANTED

GENERAL FOREMAN 25 years experience sewers, water lines, foundations, grading roads, heavy timber work and concrete. PW-49, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

MASTER DIVER: Available now. With or without gear. 20 years experience on all phases of underwater work. Reliable references if desired. Capable of taking charge of job. Go anywhere. PW-54, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

GRADUATE CIVIL ENGINEER, Licensed. 9 years experience includes surveying, construction, hydraulic and structural design, water conservation problems, road and street work, estimating etc. Draft class 3-A. Immediately available. Prefer structural design. Location immaterial. PW-64, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

ADMINISTRATIVE and ENGINEERING EXECUTIVE desires larger responsibilities in City Management field. Registered engineer, 25 years experience including power, water and sewerage plants: streets, sanitary sewer and storm sewer design and construction. If you need a practical administrator and post-war program write at once. PW-67, Engineering Nws-Record, 520 N. Michigan Ave., Chicago 11, Ill.

PROJECT MANAGER—seeks connection with construction firm, 18 years experience as contractor and work for others. Will go anywhere, domestic or foreign. Salary expectation, experience and references upon request. PW-71, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

SUPERINTENDENT—ESTIMATOR: Graduate engineer with 25 years general construction experience. Now employed in middle west. Available about Jan. 1st. PW-74, Engineering News-Record, 520 N. Michigan Ave., Chicago 11, Ill.

EXECUTIVE ENGINEER. Age 46. Licensed. Broad experience responsible charge investigations, design, construction and operation of Hydro and Diesel electric plants, Water supply and conservation works, flood control, highways and industrial plants. PW-75, Engineering News-Record, 520 N. Michigan Ave., Chicago 11, Ill.

To EMPLOYERS who advertise for MEN:

THE letters you receive in answer to your advertisements are submitted by the applicants with the hope of securing the position offered.

Frequently when there are many applicants, the only letters acknowledged are those of the most promising candidates. Others may not even receive the slightest indication that their letters have been received, much less considered. These men often become discouraged, will not respond to future advertisements, and sometimes even question their bona fide character.

Every advertisement printed in the searchlight section is duly authorized.

It will help to keep readers interested in this advertising if you will make it a practice to acknowledge every application received, even if you merely return the letters of unsuccessful applicants marked, "Position filled, thank you." If you don't care to reveal your identity, you might mail them in plain envelopes.

This suggestion is made in a spirit of friendly co-operation between employers and the men replying to Positions Vacant advertisements.

Departmental Staff

McGRAW-HILL
PUBLISHING CO., INC.

★

"Put yourself in his place"

POSITIONS WANTED

(Continued from opposite page)

SUPERINTENDENT CONSTRUCTION, twenty years industrial and high class finished projects. Engineer. Anywhere. PW-44, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

GENERAL CONSTRUCTION SUPERINTENDENT available January 1st. Excellent record and references furnished. Three years experience in foreign countries on large projects, location immaterial. PW-79, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

DESIGNER, SUPERINTENDENT, PROJECT MANAGER; Cornell; age 40; single; 17 years experience; recent designer sanitary, storm sewers; sewage disposal; airport drainage; gravity softener-filtered water treatment and pressure filters for boiler plants. Former Project Supervisor, Superintendent, Foreman of sewers, sewage disposal plants; water lines; land drainage; grading; paving jobs. Allied estimating; specification writing, material, equipment requisitioning; expediting; inspection; final payments; reports. PW-84, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

STRUCTURAL ENGINEER, Graduate C.E., age 50, seven years experience planning, design and supervision on industrial buildings, power plants, pulp and paper mills, locks, wharves, docks and appurtenant structures. Three years construction experience. Good executive. Knowledge of Spanish. PW-85, Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.

Don't forget the **Box Number**

WHEN answering the classified advertisements in this magazine, don't forget to put the box number on your envelope. It's our only means of identifying the advertisement you are answering.

WORK WANTED

EQUIPPED SURVEY PARTIES for all types of surveyor construction work. Any location. Harwood, 258 Broadway, New York City.

PATENT ATTORNEYS

PATENTS, TRADE MARKS. Booklet: "General Information Concerning Inventions and Patents and Fee Schedule" sent without obligation. Established 1915. Lancaster, Allwine & Rommel, Suite 454, 815 15th St., N. W., Washington, D. C.

WANTED

TRANSITS AND LEVELS accurately repaired, also bought, sold or rented; quick, first-class service. Griner, 920 Oak, Kansas City, Mo.

FOR SALE

FOR SALE—Asphalt Travel Plant complete. Can also be used as a Central Plant. Capacity 40 to 75 tons per hour. Delivery 15 days. Located near Chicago. Subject to prior sale. FS-87, Engineering News-Record, 520 N. Michigan Ave., Chicago 11, Ill.

DESIGNING ENGINEERS

Manufacturer nationally advertised system timber construction desires designing engineers as distributors. Liberal discounts for part time work. Good opportunity for postwar business. State experience, age.

RW-868, Engineering News-Record
330 W. 42nd St., New York 18, N. Y.

ALFRED MONTUORO
Concrete Rock Breaking

Rock Drilling and Blasting; Sewer and Water Connections; Compressors Rented; Excavations for Trench Lines; Concrete Rock Breaking Dust Control; Tanks, etc; Conduits; Boilers.

2238 Adams Place **New York City**
Tel. FOrdham 5-5080

FOR RENT

Lorain 1½ yd. Diesel Shovel, owner operated; will go anywhere.

GEORGE COLE
3119-94th St., Jackson Heights, Long Island
Newtown—9-5570

COMPLETE STONE CRUSHING
or
SAND and GRAVEL PROCESSING SERVICE
available on tonnage basis

We will install MODERN portable or semi-portable plant in any practical location from Coast to Coast. Capacities 100 to 150 tons of stone per hour or 150 to 200 tons of sand and gravel per hour.

ESTIMATES FURNISHED WITHOUT OBLIGATION

Address

Contractors Service Corp.
Box 579, Harrisburg, Pa.

PUMPING EQUIPMENT FOR SALE

The Cedar Grove, New Jersey Water Department has for sale and will receive and consider proposals in a meeting of the Board of Commissioners of Cedar Grove, January 17th, 1944, for the purchase of the following:

ONE G. E. ELECTRIC MOTOR
Type 526 V 220 C 60 HP 35-40 7c Amps
ONE LEE & COURTNEY PUMP
No. 5858 Type 3"—T Stages 4 GPM 250 RPM 1165 Ft. Head 238
ONE BUFFALO GASOLINE ENGINE 40 HP
For Emergency Power.

The above listed equipment has never been used and is not required by the Department offering same.

The Board of Commissioners of Cedar Grove reserves the right to reject any or all bids received.

Proposals should be addressed to the Board of Commissioners, Cedar Grove, New Jersey, care of the Town Clerk.

Equipment may be inspected during business hours at the Municipal Garage, 525 Pompton Avenue, Cedar Grove, New Jersey.

JOHN H. MONROE
Township Clerk

SURVEYING INSTRUMENTS

USED • REBUILT • SALE • RENT • REPAIRING

TRANSIT and LEVEL REPAIRING

Fully equipped modern shop—all makes repaired
Low cost—service unsurpassed—all work guaranteed
Send for list of reconditioned instruments
We pay cash for used instruments

NATIONAL BLUE PRINT CO.

210 S. Canal St. Est. 1914 CHICAGO, ILL.
Chicago Sales Representatives—W. & L. E. Gurley

PRECISION SHOP REPAIRS

All makes—all sizes—repaired and regraduated by Factory Experts. The finest work at the LOWEST POSSIBLE COST. Unusually good instruments for sale or rent. Guaranteed for two years. A special Souvenir Plumb Bob for 6c to graduate Civil Engineers.

M. L. McALLISTER
Highest grade Buff's For Sale
Boston 30, Mass.

Your inquiries to advertisers will have special value . . .

—for you—the advertiser—and the publisher if you mention this publication. Advertisers value highly this evidence of the publication you read. Satisfied advertisers enable the publisher to secure more advertisers and—more advertisers mean more information on more products or better service—more value—to YOU.

X-14-1

TRANSITS AND LEVELS

New or Rebuilt
Sale or Rent

Headquarters for REPAIRS — any make. Factory Service. We will also *buy* your old instruments or take them in *trade*.

A complete line of Engineering Instruments and Equipment for Field or Office. Write for Catalogue NR812.

WARREN-KNIGHT CO.
Manufacturers of Sterling Transits and Levels
136 No. 12th St., Philadelphia 7, Penna.

ALL MAKES

R E-BUILT
EPAIR
ENT
EAL EXPERTS

BUFF

69 Dey St., New York

2—TRACTOR ANGLEDOZERS
Caterpillar RD7 Equipped with LaPlante Choate Angledozer

4—AUTO PATROL GRADERS
Caterpillar Model 12 Equipped with Scarifier

CHARLES H. HOCH

424 N. Madison St.	225 W. 34th St.
Allentown, Pa.	New York 1, N. Y.
Phone 4191	Phone CHickrng 45663

DRAGLINE

30B, BUCYRUS, 1 yd., 50 ft. Boom. Old-yes, but in good condition! Needs only one Worm Gear—costs $90. Motor ruined by vandals. Machine used only intermittently over a period of approx. 10 yrs. for maintenance on irrigation project. Track good. Splendid for gravel plant, stock piling, etc. Less motor, fob cars here..........$1,300.

MINE & SMELTER EQUIPMENT CO.
Phoenix, Arizona

FOR SALE
RANSOME PAVER 27E
28 FOOT BOOM
Used on one job only.
FS-41, Engineering News-Record
330 W. 42nd St., New York 18, N. Y.

SHOVELS, CRANES, DRAGLINES

Moore Speedcrane, 15 tons, 65′ bm. gas
Brownhoist 7½ ton Crane, gas
N. W. 105 Shovel & Backhoe, Rebuilt
N. W. 104 Shovel and Crane
Lorain 45 comb. Shovel & Crane
General Excavator ½ yard Backhoe
P & H 650 Electric Shovel, 1¼ yd.
P & H 700 comb. Shovel, Crane & Dragline, 1½ yd.
Buc. Erie 230 Steam Dragline, 175′ bm.
Buc. Erie 50B Steam Crane, 100′ bm.
Buc. Erie 50B Steam Shovel & Dragline
Buc. Erie 30B 1 yd. Steam Crane
Buc. Erie 1030 Electric Tunnel Shovel
Marion No. 7 Electric Shovel, 1 yard
Ind. Brownhoist Crane 10 tons, 40′ boom
Koehring 301, ¾ yd. Crane & Shovel.
Bay City ½ yd. Backhoe & Shovel, gas
Brownhoist Loco. Crane, gas, 15 tons.
Brownhoist Loco. Crane, Steam, 35 tons

TRUCK CRANES

Mead Morrison 9 ton, 3 axle 10 whl. Mack
Orton 8 ton, 3 axle, 10 wheel Mack.
General 8 ton, 3 axle, 10 whl. Mack

BUCKETS

Williams Hercules 5 yd. Clam. Dredging
Blaw-Knox 5 yd. Dreadnaught Clam. rehandling
Owen Model 63, type H Rock Grapples
Hayward 1 yd. Clam. rehandling.
Haiss ½ yd. Clam. rehandling.
Blaw-Knox ⅞ yd. Clam. digging
Hayward ⅞ yd. Clam. digging
Williams ¾ yd. Clam. rehandling
Erie ¾ yd. Clam. rehandling
Hayward ¾ yd. Orange Peel

TRACTORS—BULLDOZERS—SCRAPERS

Int. TD18 with bulldozer & scraper. Rebuilt
Allis Chal. "L" Tractor-Bulldozer, rebuilt.
Allis Chalmers "L" Tractor with bulldozer
Allis Chalmers "S" Tractor with bulldozer
Caterpillar 30 Tractor with Bulldozer
Heil 12 yard Scraper, rebuilt

LOCOMOTIVES & CARS

Whitcomb 14 ton, Diesel, 36″ gauge.
American 75 ton, steam, std. ga. rebuilt
Baldwin 65 ton, steam, std. ga.
American 60 ton, steam, std. ga.
American 50 ton, Saddle Tank Switcher
American 45 ton, Saddle Tank Switcher
Vulcan 8 ton, std. gauge, gas.
Davenport 10 ton, std. gauge, gas.
Whitcomb 6 ton, 36″ gauge, gas
Vulcan 21 ton, Saddle Tank, 36″ ga.
Porter 12 ton, 36″ gauge, Steam
5—Flat cars, 40 tons.
10—Phoenix 5 yd. std. gauge Dump Cars

CONCRETE PLANTS—MIXERS

Blaw-Knox 350 bbl. Bulk Cement Bin
Blaw-Knox 85 ton, 3 compt. Bin.
Blaw-Knox 200 ton, 3 compt. St. Bin
Koehring 34E Dual Drum Paver
Ransome 27E Dual Paver
2—Koehring 27E Pavers
Heltzel 3 compt. Steel Bin 85 tons
2—Ransome 27E Paving Mixers
Smith 3 yd. Tilting Mixer, air dump
2—Rex 1 yd. Stationary Electric Mixers

ROAD ROLLERS

B. S. 12 ton, 3 wheel, gas.
B. S. 10 ton, 3 wheel, gas.
B. S. 10 ton, 3 wheel, steam
B. S. 5 ton, 3 wheel, gas.
Gallon 10 ton, 3 wheel, gas

HOISTS

10—I.R. Material, Air, 500 lbs. cap.
Clyde D.D. gas, 125 HP., 5 ton S.L.P.
Flory single drum, Electric, 100 HP.
Stroudsburg D.D. 25 HP., gas.
Lidgerwood D.D. gas, 100 HP., 2000# line pull
Lidgerwood 3 drum, 100 HP., elec.
Lidgerwood 3 drum, 80 HP., elec.
Lidgerwood D.D., 10 x 12, steam
Lidgerwood Double Drum 75 H.P., gas
Lidgerwood 3 drum, 125 H.P. elec.
Clyde Shaft, drum 48″, 100 HP. Elec.
Lambert 9½x12, 3 dr. steam

DERRICKS—STEEL & STIFF-LEG

Amer. Terry 35 ton stiff-leg, 100′ bm.
Amer. Terry stiff-leg 30 ton, 100′ bm.
Clyde stiff-leg 16 tons at 50′, 100′ bm.
Amer. Terry Guy 20 tons at 50′, 90′ bm.
Amer. Terry Guy No. 2, 20 tons at 30′, 100′ bm.

AIR COMPRESSORS

I. R. 1085 CFM, 2 stage, electric
Sullivan 1051 CFM, 2 stage, Diesel
Sullivan WN3 1400 CFM, Electric
I. R. 888 CFM, 2 stage, electric
I. R. 528 cu. ft. electric belt drive
I. R. 2 stage, portable, 315 cu. ft.
I. R. portable, 310 cu. ft. gas

SPECIALS ! !

7—Euclid Trac-Trucks, 8-10 yds
3—Koehring Wheelers, 10-12 yds
Allis Chalmers 56″x84″ Jaw Crusher
Steel Pile Driving leads 75′
Vulcan No. 1 Pile Hammer
25—50 ton Gondola Cars, rebuilt

TRENCHERS—BACKFILLERS

Parsons Model 21 Trencher
Barber Greene No. 44D Trencher
Parsons Model 40 Trencher
Cleveland Backfiller & Tamper

MISCELLANEOUS

5 ton Bedford O.E.T. Crane, 50′ span, 2 motors AC
7½ ton Bedford O.E.T. Crane, 50′ span, 2 motors AC
Allis Chalmers 10″ cent. Pump, elec.
Barnes 4″ Duplex Portable Pump, gas
American 4″ Sump Pump, electric
7000 ft. 9″x9″ Road Forms.
8000 ft. 8″x8″ Road Forms.
3,500 ft. 7″x7″ Road Forms
Jaeger Lakewood Type D 12 to 25′ Screed
Jaeger Lakewood 12 to 25′ Screed
Truck Turntable, 30 tons Capacity
2—Contractors Electric Saw Tables
Steel Storage Bin 200 tons cap.
2—Mack Trucks 6BX, Boulder Type.
2—Sterling Trucks,170-C,Boulder,12 yds.
McKiernan-Terry Steam Pile Hammers, Nos. 10B3, 9B2, 7, 6, 5.
Generator Sets, electric and Diesel Drive
Rex Pumpcrete Nos. 180, 190, 200

30 CHURCH STREET **RICHARD P. WALSH CO.** **NEW YORK, N. Y.**

CARS

1—Jordan Spreader Car, all steel.

6—20 yd. K. & J., all steel, air dump Cars, vertical air dump cylinders, air brakes, etc.

CRANE—OVERHEAD

1—8 ton, 4 motor, 36 ft. span, cage control, 220 volt, D.C.

CRUSHING PLANT

1—Complete Stone Crushing Plant, capacity 850 tons per day. Principle items are: 1—Farrel 24 x 36 Jaw Crusher; 1—Traylor 3′, type TY, Reduction Crusher; 1—4 x 12 triple deck Screen; 1—long 24″ Belt Conveyor and 1—short 18″ Belt Conveyor, complete with steel bins. Plant can be operated with electric motors, all of which electrical equipment is available or can be operated with two 100 H.P. Diesel Motors and one 50 KW Diesel Motor Generator Set. Plant all set up in working position; perfect condition throughout; immediate delivery.

CRUSHER SPECIALS

Symons Cone 3 ft., 4 ft. and 5½ ft. 4 ft. is with short head.

Allis Chalmers 7 x 12

Reliance 15 x 24.

Superior McCully 20″ Gyratory.

MINE HOIST

1—Vulcan, single drum, 96″ dia., 78″ face, 750 FPM, 500 H.P., A.C. motor and all control equipment.

LOCOMOTIVES

1—American 41 ton, 4 wheel, saddle tank, standard gauge, cylinders 14 x 22, ASME boiler, 190 lbs. working pressure; for sale or rent.

1—80 ton, 6 wheel, Switcher with piston valve, with tender, superheater, code boiler, 200 lbs. pressure, electric lights, Walschaert valve motion, automatic lubrication; thoroughly modern, excellent condition, immediate delivery.

2—68 ton, 6 wheel Switchers, same as above.

1—6 ton, Whitcomb, 36″ gauge, gas.

SCREEN

1—Link Belt 3 x 8, double deck, 5 H.P. motor.

LOG WASHER

1—Allis Chalmers 25 ft., heavy duty, Hutch type, Log Washer, with steel tank, ⅜″ plate, with 2 logs with paddles, 35″ dia.

JAW CRUSHERS, GYRATORY CRUSHERS, ROLL CRUSHERS, DRYERS AND KILNS, HOISTS, CARS, CRANES, SHOVELS, ETC.

We will buy any modern piece of equipment anywhere

A. J. O'NEILL
Lansdowne Theatre Building
LANSDOWNE, PA.
Phila. Phone: Madison 8300

1—McMyler 25-ton Gantry Structure only, Portal type, C to C track 16′—Ht. Rail to Rot. Base 35′. Never used.

SPECIAL

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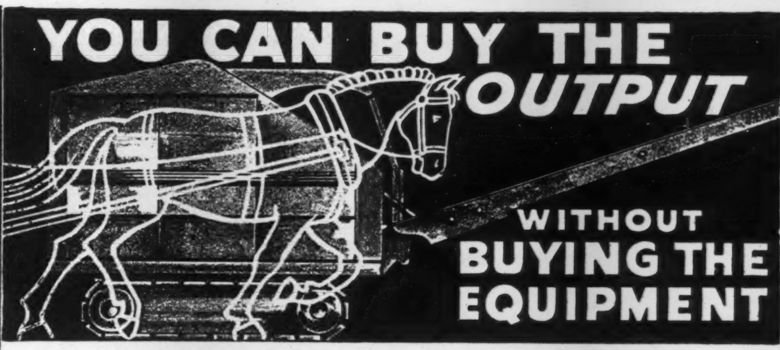

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36″	6	1/8″	1/16″	18″	4	1/8″	1/32″
30″	6	1/8″	1/16″	16″	4	1/8″	1/32″
30″	5	1/8″	1/16″	14″	4	1/16″	1/32″
24″	5	1/8″	1/32″	12″	4	1/16″	1/32″
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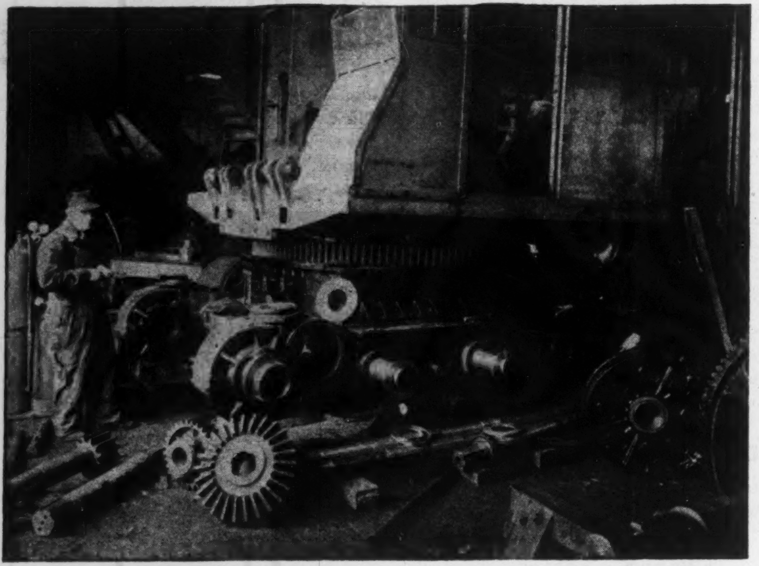

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The list below shows what we have on hand as this paper goes to press.

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STAMPS

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1—P. & H., 600, No. 2503, 1 yd. Shovel, on 24" Crawlers, gasoline driven. Crane attachment if desired.

1—Orton, Model T, ¾ yd. Crane, 36 ft. Boom. Crawler mounted. Gasoline driven.

1—Mead-Morrison, "Giant Half Yard," No. 18647, Shovel and Crane, Crawler mounted. Gasoline driven.

1—Speeder, Model B-2, Serial No. 757, ½ yd. Trench Hoe and Shovel. Crawler mounted. Gasoline driven.

1—Bucyrus-Erie Model 10-B, Serial No. 13317. ⅜ yd. Shovel, 33 ft. Combination Dragline Clamshell Boom with Fairleads, ⅜ yd. Dragline Bucket and ⅜ yd. Clamshell Bucket. Crawler mounted. Gasoline driven.

2—Byers, "Bear-Cat", ½ yd. Cranes, 30 ft. Booms, Crawler mounted. Gasoline driven. Can fit Trench Hoes.

2—Insley, Type "C", Serial Nos. 873 and 886, ⅜ yd. Shovels, Amsco Dippers, ⅔ revolving. Crawler mounted. Gasoline driven. Can fit Trench Hoes.

1—Bay City Tractor Shovel, Trench Hoes, Cranes or Draglines all ⅜ yd. capacity. Crawler mounted. Gasoline driven.

1—P. & H., Model "35", Backfiller-Crane, 25 ft. Boom, 1 ton capacity. Crawler mounted. Gasoline driven.

1—Parsons, Backfiller-Crane, 25 ft. Boom, ¾ ton capacity. Crawler mounted. Gasoline driven.

2—Clark Tructractors, with Silent Hoist Co. winches, ¾ ton lifting and carrying capacity. Gas driven, on solid rubber tires. Ideal for industrial plant service.

PILE DRIVER

1—Bucyrus, 20-B, on Crawlers, Steam Driven, Crane Boom 40 ft., Pile Leads. Also Complete ¾ yd. Shovel Attachment. Fitted with fuel oil burner. Boiler completely retubed. Rebuilt and ready to go.

25 Years of Experience

RENTALS

You may rent some of the above listed machines. We will make them ready to go out on your job quickly.

WRITE US WHAT YOU NEED

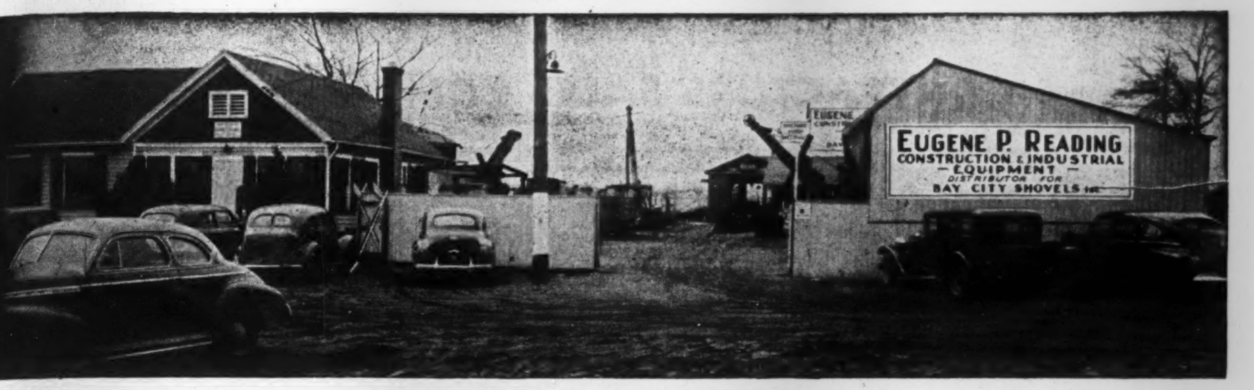
ATTACHMENTS

We have in stock Shovel, Crane, and Trench Hoe Attachments to fit various makes of Machines.

TELL US WHAT YOU REQUIRE

Next Job-Call Reading*

Inspect Shops and Equipment



MAIN OFFICE, SHOPS AND YARD, ROSELLE, N. J.

TRUCK LOADER

1—Barber-Greene, Model 42, self-feeding, crawler, mounted, 4 cyl. Buda Gasoline Motor, loads from stock piles 1 to 1½ tons per minute.

ROAD ROLLERS

1—Huber, 10 ton, 3 wheel, 4 cyl. Gasoline Driven, with Scarifier.
1—Acme, 6 ton, 3 wheel, 4 cyl. Gasoline Driven, with Scarifier.

TRACTORS—SNOW PLOW

1—Caterpillar, Model 30, Bulldozer, Gas.
1—Caterpillar, Model 50, tractor only, Gas.
1—Cletrac, Model 55, Tractor, Gas, with Sargent "V" type Snow-Plow attached. Hydraulic controls, Storm Cab. Electric Lights for Night running. Self starter, 1936.

ROCK CRUSHING OUTFIT

1—Climax, size 2½, 10"x20" Jaw Opening, 24 ft. elevator and 36" dia. x 12' long, 4 section Revolving Screen.

TRUCK CRANE

1—Universal, 7½ ton, with 28 ft. Boom, mounted on A.C. Mack 4 speed chassis. Solid Rubber Tires. 2 sets of telescopic outriggers.

ROAD PAVERS

1—Multi-Foote, 27-E, 6 cyl. Gas Motor, N.J.H.D. Approved. With Distributing Boom and Bucket. Crawler mounted.
1—Koehring, 27-E, Gas Motor, full equipment excepting Boom and Bucket. Ideal for bridge footings, etc. Crawler mounted.
1—Koehring, 7-E, 4 cyl. Gas Motor, high drum end loading skip and end discharge chute, on broad faced traction wheels.

SHOVEL ATTACHMENTS

1—P. & H., Model 650, 1¼ yd. Shovel front.
2—P. & H., Model 600, 1 yd. Shovel fronts.
1—Northwest, Model 104, 1 yd. Shovel front.
1—Bucyrus-Erie, Model 1030-1035, ⅞ yd. Shovel front.
1—Northwest Model 105, ¾ yd. Shovel front.
1—Bay City, Model "R", ¾ yd. Shovel front.
1—Koehring, Model "301", ¾ yd. Shovel front.
1—Bay City, Model "K", ½ yd. Shovel front.
5—Bay City, Tractor Shovel, ⅜ yd. fronts.
1—P. & H., Model 300, ½ yd. Shovel front.
1—P. & H., Model 200, ¾ yd. Shovel front.

TRENCH HOE ATTACHMENTS

1—Page, 1 yd. Heavy Duty, can be adapted to any Heavy Duty, 1 yd.—1¼ yd. or 1½ yd. Machines.
1—Koehring, ¾ yd. Model 301, Trench Hoe.
1—Bay City, ¾ yd. Model "R", Trench Hoe.
1—P. & H., ¾ yd., Model 400, Trench Hoe.
1—Mead-Morrison, "Giant Half Yard," Trench Hoe.
1—Bay City, ½ yd., fits Model 20—25 or late Model 30.
2—Bay City Tractor Ditcher attachments.
1—Insley, Type "C" Ditcher Bucket and Handle, ½ yd. 26" cut.
1—Byers, Ditcher Bucket and Handle, ½ yd. 32" cut.

BUCKETS

1—Hayward, Model "K", 2 yd. Heavy Duty Digging Clamshell with teeth.
1—Hayward, Class "E", 1¼ yd. Rehandling Clamshell.
1—Williams, 1 yd. Rehandling Clamshell.
1—Lakewood, 1 yd. Rehandling Clamshell.
1—Williams, ¾ yd. Lever Arm Clamshell.
1—Haiss, ¾ yd. Digging Clamshell with teeth.
1—Haiss, ¾ yd. Rehandling Clamshell.
1—Blaw-Knox, ¾ yd. Size 613, Dreadnaught Clamshell with teeth.
1—Hayward, 21 cu. ft. Multi-Power Orange Peel.
1—Hayward, 7 cu. ft. Orange Peel.
1—Blaw-Knox, ½ yd. Size 607, Digging Clamshell with teeth.
1—Blaw-Knox, ½ yd. Size 606, Dreadnaught Clamshell with teeth.

Several Side Dumps and Bottom Dump Buckets, also some small Scale boxes and Dragline Buckets.

AIR COMPRESSORS

3—Worthington, 315 cu. ft., 2 stage, portables, powered by 6 cyl. Hercules Gasoline Engines, each on highway trailer mountings with solid cushion Rubber Tires. Fitted with 3 special tool boxes. Riveted air receivers, large size. New 1936 and 1937, used only in stand by service, actual use has been very little. The practical equal of new machines. Actual cost of each new was over $5,500.

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FOR RENT

TRACTORS
Allis-Chalmers Tractors with Baker Bulldozers
2 Model HD-14, 132 h.p.
1 Model L, 91 h.p.
4 Model HD-10, 86 h.p.
7 Model K, 55 h.p.

ROLLERS
2 Buffalo-Springfield, 3-wheel, 8-ton, Gas

SHOVEL
Bucyrus-Erie 10-B, extra Back hoe and Crane Booms.

PUMPS
10 Rex, 2", 3", and 4" Centrifugal

CONCRETE FINISHER
1 Jaeger, 10—12½ ft. widths.

COMPRESSORS
Ingersoll-Rand, 2-stage air-cooled, and tools
2—315 cu. ft.; 25 CC80 Breakers
4—105 cu. ft. 8 JB-5 Drills

FOR SALE

TRACTOR AND SCRAPER
Allis-Chalmers Model L, 90 Draw Bar H. P. with 8 yd. Gar Wood Hydraulic Scraper

GRADER Warco, Model 35, 8-wheel Tandem

DRILL STEEL
Ingersoll-Rand Thread 1¼", 2 to 24 ft. lengths, 11,000 lbs.
Timken Thread 1¼", 2 to 12 ft. lengths, 2,000 lbs.

ROLLER Acme, 3-wheel, 10-ton

CRUSHER Climax, 13 x 26, with 35' Bucket Conveyor
MIXER Jaeger, 14S, 4-wheel
RIPPER 1 H-80 Gar Wood, hydraulic
HOIST C. H. & E., gasoline, 15 H. P. Single Drum
DITCHER Austin, model 105
BACKFILLER Austin, Model BF5 (1,800 lbs. capacity)
FINISHER Blaw-Knox, gas-electric, 9-11 foot widths
PUMP C. H. & E., 6". Centrifugal

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is an index of reliable sources for Used and Surplus New Construction Materials and Equipment now available. Consult the **Searchlight Section** in following issues for later offerings.

If you don't see what you want—ask for it. Ask the advertisers. Dealers are constantly adding to their stocks and may have acquired just what you need. Or, shall we ask them for you?

And, when you have special items to dispose of, dealers will be glad to know of it; or you can use this Searchlight Section to contact user-buyers direct, if you prefer. Send a list of your equipment and we will gladly give full information as to space and rates.

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2—Whitcomb Locomotives, Gas—12 ton—36" Gauge—Rebuilt.
20 ton Ohio Loco-Crane—50 ft. boom.
27-E Smith Paver—Model H-31—Boom and Bucket—also Tower.
Hayward 2 Yd. Orange-Peel Bucket.
¾ Yd. Model 400 P & H Shovel.
1 Yd. Link Belt K-30 Shovel.
1 Yd. Northwest 105 Shovel-Crane.
10 ton Buf-Spr. Roller, Gas, 3 Wh.
8 ton Buf-Spr. Roller, Gas, 3 Wh.
Eimco Loaders, Models 12B and 20.
Gardner-Denver Loader, Model GD-9.
5—Electric Hoists, 40, 50 and 60 HP.
Gard-D. Compressor, 630' A. A., E. Dr.
2—Ing.-Rand 110" Compressors.
22—Busters, Spades, Jackhammers, Sheeting Hammers.
1 Yd. Round Shaft Buckets.
1 Yd. and ½ Yd. Dump Buckets.
2—Shovel Attach. for Byers Bearcat Jr.
Shovel Attachment for 41-B Bucy-Erie.
McK-T Pile Hammers 3, 5, 7 also 6 with pulling attachment.

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32 Bay City Crane-Dragline-Hoe
1030—¾ yd. Bucyrus Erie Crane Dragline
1 Yd. Osgood Crane Dragline
105—1 Yd. Northwest Crane Dragline
75 1 Yd. Lorain Shovel
D-2—1 Yd. Bucyrus Erie Shovel Crane Dragline (Diesel)
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Shovel for #4 Northwest
Shovel for 1¼ yd. Lorain
½ Yd. Universal Truck Crane pneumatics
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Caterpillar "50" Diesel Tractor
Ateco Bulldozer for Cat "50"
2—¼ yd. Page "C" Dragline Bucket
105 Austin Trencher
C-10 Buckeye Ditcher
201 Buckeye Ditcher
"L" Allis Chalmers Tractor with Gar Wood Angledozer
1200 Gal. Water Tank on 4-wheel trailer
27-E Rex Paver and Batching Bin
#2 Adams Retread Paver
2½ yd. Hayward Clamshell Bucket
4 yd. Hayward Clamshell Bucket
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29-W Bucyrus Armstrong Drill Rig and Tools

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1—Lima 750 Gas 1¾ yd. Shovel
1—Lorain 78 Diesel 1½ yd. Shovel
2—Lorain 77 Diesel 1½ yd. Shovels
1—Northwest 4 Backhoe, ⅞ yd.
2—Northwest 4 Cranes, 50' boom, 15 ton cap.
1—Bay City Model 15 Truck Crane, ½ yd. cap.
1—Austin-Western Mod. 99 power Grader

FOR SALE

1—Bucyrus-Erie 43-B Diesel Shovel, 1¾ yd.
1—Lorain 75B Gas 1¼ yd. Shovel & Backhoe
1—Speeder B-1 Gas ½ yd. Shovel & 30' Crane
1—Lorain 30 Gas ½ yd. Backhoe, 1940
1—Lorain 40 ten wheel Truck Crane, 40' boom
1—Austin-Western Mod. 77 power Grader
4—International Diesel Bulldozer: TD-18; TD-40; TD-35
3—Caterpillar Diesel Bulldozer: D-8; RD-6; D-4
4—Allis-Chalmers Gas Bulldozer: SO & L

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Small Dump Trucks.
Boom truck with skids 20' Body.
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Universal Crane Model 360 mounted on Mack Chassis

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1—½ yd. Browning Digging Bucket with teeth
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1—50 ft. Bm. for Ind. Loco. Crane 25 tons cap.
1—6" Humdinger Pump & 1—4" Humdinger Pump
6—Easton 4 yd. 36" Gauge all steel Dump Cars

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Special—Butler 900 ton, 4 compartment bin, excellent condition.

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Clam buckets, all sizes
Conveyors, many sizes
Byers Model 60 crane
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Gruendler 10x20 crusher
Northwest 1 yd. dragline
Waukesha 95 HP engine
Haiss Model 80 loader
Barnes 4" pump
6 ton tandem gas roller
Bay City ¾ yd. shovel
Silent Hoist tractor crane
Oscood 1 yd. trench hoe
6 wheel truck crane

Wanted:—Gas or Diesel crawler cranes, all sizes, any quantity.

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1—Rebuilt Sullivan gas engine driven portable Air Compressor, model 210.
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1—New LeRoi—60 gas engine driven Compressor on 2-wheeled trailer.
17—New LeRoi—105 gas engine driven Compressors on 2-wheeled trailer.

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A number of rebuilt pumps available.
2—New Carver 2" 7,000 g.p.h. centrifugal pumps.
5—New Carver 2" 10,000 g.p.h. centrifugal pumps, mounted on two steel wheels.
3—New Carver 3" 15,000 g.p.h. centrifugal pumps on two steel wheels.
2—New Carver 4" 40,000 g.p.h. self-priming centrifugal pumps on two steel wheels.
1—New Carver 6" 90,000 g.p.h. self-priming centrifugal pumps on two wheeled trailer.
6—Rebuilt Carver 2" 10 M g.p.h.

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1—Rebuilt 20 K.W. 125 volts, Fairbanks-Morse Diesel Generator.
2—Rebuilt 15 K.W. 110 volts, Allis-Chalmers gas engine driven Generators.
40—New Lister-Blackstone "Nitehawk" Portable 5 K.W. 120 volts, AC, Generator Sets, complete with four 1,000 watt reflectors mounted on 8′ telescopic extensions mounted on two-wheel spring mounted trailer.
1—Rebuilt 18.7 KVA Superior diesel engine driven Generator, direct connected, powered with 2 cylinder engine, 1200 r.p.m. and Columbia Generator, 220 volts, 3 phase, 60 cycle, .8 power factor. Machine in excellent condition.
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10—New 10 KVA Kohler Generating Sets, gas engine driven, DC and AC, complete with housing, remote control, or fully automatic, single phase and three phase, optional.
3—New 4 KVA Master Generating Sets, gas engine driven, Wisconsin Motors, air cooled.
4—New 7 KVA Kohler Generating Sets, gas engine driven, both DC & AC, manual control, fully automatic and remote control.

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12—Cleveland Paving Breakers
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Large supply of air hose for immediate delivery.
1—Cleveland pneumatic chipping hammer, Model 2X.

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5—New 300 amp. Arc Master Welder, powered by a Chrysler gas engine; skid mounted, or otherwise.

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6, Dump, Magor, Automatic, 25-Yd. 50-Ton
8, Dump, Western, Automatic, 27-Yd., 40-Ton
2, Dump, Western, Automatic, 27-Yd., 50-Ton
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25, Dump, Magor, Automatic, 30-Yd., 50-Ton
25, Flat, 40-Ft., 40-Ton
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GASOLINE DOUBLE DRUM HOISTS

1—Clyde, powered by V12, 125 H.P. Zephyr engine, 3 speed transmission, 10,000 lbs. Line Pull
1—National, powered by V12, 125 H.P. Zepyhr engine, 3 speed transmission, 10,000 lbs. Line Pull complete with attached swinger
2—Thomas, powered by V8, 100 H.P. Mercury engines, 8,000 lbs. Line Pull, with or without swingers
1—National, powered by V8, 100 H.P. Mercury engine, 7,200 lbs. Line Pull, with or without swinger
2—Lidgerwood, powered by V8, 100 H.P. Mercury engines, 6,000 lbs. Line Pull
1—Orr & Sembower, powered by 15 H.P. LeRoi engine, 2,850 lbs. Line Pull

ELECTRIC DOUBLE DRUM HOISTS

1—Lidgerwood, powered by 80 H.P. A.C. motor, 9,000 lbs. Line Pull, with swinger
1—Lambert, powered by 80 H.P. A.C. motor, 9,000 lbs. Line Pull, with swinger
1—Lambert, powered by 60 H.P. A.C. motor, 9,000 lbs. Line Pull
2—Lambert, powered by 60 H.P. A.C. motor, 8,500 lbs. Line Pull, with or without swinger
1—Thomas, powered by 50 H.P. A.C. motor, 6,000 lbs. Line Pull, with swinger
1—Lambert, powered by 60 H.P. A.C. motor, 6,000 lbs. Line Pull, with swinger
1—Lambert, powered by 60 H.P. A. C. motor, 5,600 lbs. Line Pull
1—Lambert, powered by 60 H.P. A.C. motor, 4,800 lbs. Line Pull

STEAM HOISTS

1—Double Drum American, 10x12, front drum capacity, 27,000 lbs. pull, rear drum capacity 13,500 lbs. Line Pull
1—Three Drum Stroudsburg 8¼x10 with boiler

INCLINE HOISTS

1—Clyde, powered by 100 H.P. A.C. electric motor, Line Pull 8,200 lbs. at 340′ per minute
1—Clyde, powered by 100 H.P. A.C. electric motor. Line Pull 12,000 lbs.

ELECTRIC THREE DRUM HOISTS

1—Maine, powered by a 52 H.P. A.C. Motor. Line Pull 6,750 lbs. with swinger

SINGLE DRUM HOISTS GAS & ELECTRIC

12—Lambert, powered by V8, 100 H.P. Mercury engines, 2,500 lbs. Line Pull
1—National, powered by 35 H.P. Buda engine, 3,500 lbs. Line Pull
1—Novo, powered by 35 H.P. Buda engine, 3,500 lbs. Line Pull
1—Novo, powered by 35 H.P. Buda engine, 2,000 lbs. Line Pull
4—Thomas powered by 35 H.P. Buda engines, 2,000 lbs. Line Pull
1—Lambert, powered by 15 H.P. LeRoi engine, 2,500 lbs. Line Pull
1—Lidgerwood, powered by 60 H.P. A.C. motor, 6,000 lbs. Line Pull
1—Lidgerwood, powered by 40 H.P. A.C. motor, 2,000 lbs. Line Pull
1—Lidgerwood, powered by 35 H.P. A.C. motor, 2,000 lbs. Line Pull
1—Lambert, powered by 35 H.P. A.C. motor, 2,000 lbs. Line Pull
1—Lidgerwood, powered by 35 H.P. A.C. motor, 4,000 lbs. Line Pull
1—Lidgerwood, powered by 15 H.P. A.C. motor, 2,500 lbs. Line Pull

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1—All Steel American Terry #16-100 Boom

Capacities

100′ Boom Tons Radius	85′ Boom Tons Radius	70′ Boom Tons Radius
20 @ 65′	25 @ 50′	35 @ 35′
18 @ 70′	21 @ 60′	30 @ 40′
15 @ 80′	18 @ 70′	25 @ 50′
13 @ 90′	15 @ 80′	21 @ 60′
		18 @ 70′

1—All Steel #10 American-Terry 55′ Boom. Capacity—7 tons at 40′ radius
4 tons at 50′ radius
1—10 ton American-Terry wood derrick complete with 70 ft. steel boom
5—40 tons capacity C hooks

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10—½ and 1 yd. Concrete Tower Buckets
25—Tower and Floor Hoppers
1—1 yd. bottom dump concrete bucket
4—Gasoline portable sawtables
10—Crane Wheels, double flapped, 24" diameter 3½" face, 5" diameter shaft with double bearings
9—3"-4"-6" Gasoline Self-Priming Portable Pumps

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1—Mead-Morrison combination ⅝ yd. shovel and crane, gasoline powered, crawler mounted. Completely rebuilt and in guaranteed condition.
1—P & H Combination Shovel and Dragline, gasoline powered, crawler mounted.

COMPRESSORS
2—105 cu. ft. gasoline, portable Schramm
1—160 cu. ft. gasoline, portable Ingersoll-Rand
1—110 cu. ft. gasoline, portable Ingersoll-Rand
4—110 cu. ft. gasoline, portable Worthington

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3—H-17 Cleveland Rock Drills
5—H-7 Cleveland Rock Drills
13—X-59 Ingersoll-Rand Rock Drills
1—S-49 Ingersoll-Rand Rock Drill
18—BC4 Ingersoll-Rand Rock Drills
3—BC2 Ingersoll-Rand Rock Drills

Large stock of miscellaneous pneumatic tools, chippers, riveters, drills. tool holders, reamers, lathe dogs, sleeve sockets, gear cutters, miscellaneous taps, dies, etc.

SHOVEL ATTACHMENTS
1—⅞ yd. for Koehring #301
1—¾ yd. for #1 or #2 Northwest
1—1 yd. Speedshovel

HOISTS
2—Lidgerwood Double Drum, no power, suitable for electric or gas, 75-100 H.P. units.

TRACTOR
1—Model BG Cletrac, gasoline powered

CONCRETE MIXER
1—Jaeger 10-S Mixer with power loader and water tank, solid rubber tired wheels, powered by six cylinder Leroi gasoline motor.

BUCKETS
1—Haiss 1¼ yd. Rehandling
1—Owens 1½ yd. Rehandling
1—Owens 1½ yd. Snow Bucket
2—Hayward 1 yd. Rehandling
2—Hayward ¾ yd. Orange Peel
2—2 yd. Round Tip Over Buckets
1—1 yd. Insley Concrete Bucket
2—½ yd. Haiss Excavating

PILE HAMMERS
1—#3 Vulcan
3—#3 McKiernan-Terry
1—#2 McKiernan-Terry
2—#5 McKiernan-Terry

ELECTRIC MOTORS
1—General Electric A.C. 40 H.P., 220 volt, Slip Ring, #S1258
1—Westinghouse D.C. 25 H.P., 220 volt, #391521

ELECTRIC MOTORS (Continued)
1—Westinghouse A.C. 50 H.P., 220 volt, Slip Ring, #S2240
1—General Electric 40 H.P., Squirrel Cage
1—General Electric A.C. 22 H.P., 220 volt, Slip Ring, #684317
1—General Electric 50 H.P., 3 phase, 60 cycle, 220 volt, Slip Ring, #1004636
1—Westinghouse 5 H.P., 220 volt, A.C., #17119
1—Robbins & Meyer 20 H.P. A.C., 220 volt, Squirrel Cage, #174723
1—Otis 37 H.P., 1200 R.P.M., 220 volt, Slip Ring.

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1—100 H.P. four cylinder Waukesha Motor with twin disc clutch, rebuilt.
1—5 yd. drag type LaPlante-Choate Scraper
18—Hydraulic Watson-Stillman Jacks, 50 and 100 ton capacity
1—Ord 10′ Finishing Machine, gasoline powered, practically new.
1—Grouting Machine.
1—8″ Pulsometer Steam Pump
1—5 yd. Athey Crawler Wagon
1—Caterpillar Diesel Model D-7700 four cylinder Engine, 5¼″ x 8″
1—16 ton eight-wheel platform trailer on pneumatics, hydraulic brakes.
2—50 ft. Speedcrane Booms

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Combination Shovel and Backhoe,

Serial No. 2466 for sale. Completely rebuilt 1943. Located eastern New York.

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Three LINN TRACTION TRUCKS

Model D-33, 1934, 9 yard Dump Body, Flare Boards, Underbody Hoist, 6 cyl. Diesel engine, Electric Starter, pneumatic tires in front.

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FOR SALE

1—½ yd. Insley "Hillybilly" Shovel and Backhoe.
1—50 Caterpillar New La Plant Choate Angledozer.
1—Caterpillar 25 Widegauge.
1—Caterpillar 28 Widegauge.
3—Caterpillar 25 Standard Gauge.

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WANTED

WANTED

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ONE—Scotch Marine boiler, 60-90 Horse Power.
TWO—Steam engines, size 4¼x5.
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FOUR—Trucks for 4 yard mixers.

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W-59, Engineering News-Record
330 W. 42nd St., New York 18, N. Y.

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100,000 gallon steel gravity tank on 100′ tower. Must be in good condition. Call or wire

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Lowbed carryalls, 10 to 50 tons on pneumatic tires
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Trucks all sizes

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W-81, Engineering News-Record
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¾ to 2½ yard shovels

1½ to 6 yard draglines

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1 yd. Crane
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Approximately 200 ft. 36″ horizontal stationary belt conveyor or fittings
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Must be A-1 condition—Eastern Dely.

W-86, Engineering News-Record
330 W. 42nd St., New York 18, N. Y.

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Sizes ½″ to 1½″
Will Accept Any Quantity
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received by 10 A. M. Friday will appear in Thursday's issue, subject to space limitations.

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ENGINEERING NEWS-RECORD
330 West 42nd St., New York 18, N. Y.

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YOU MAY FIND THE MACHINE YOU NEED IN THIS LIST

Bay City Tractor Shovel—⅜ Yd.—¾ Swing
REBUILT — IMMEDIATE DELIVERY

Byers #128—Comb. ½ Yd. Shovel—35′ Crane Boom
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"Operating Condition"—Spring Dely. Rebuilt

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Attached Swingers
Gasoline - Electric - Steam
20HP 30HP 50HP 100HP

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Thomas Automatic
Material Hoists

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MIXERS
with open-end paver
Type Skips

65 Years Furnishing Prime Rental Equipment

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Motor Cranes 75′ Boom & 30′ Jib
Lorain 40 Truck Cranes 55′ boom

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15—1500 Watt 110 Volt
5—2000 Watt 110 Volt
2—5000 Watt 110 Volt
1—62 KVA—3—220-440 Diesel

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Phone 2500
Centralia, Illinois

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Lorain 40 Shovel, ¾ yd. wide cats
Lorain 40 Backhoe, ¾ yd. wide cats
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International TD-35 Diesel Angledozer

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FOR RENT
Available January 1, 1944

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2—D-8 Caterpillar Tractors with Angle Dozer Blades.
2—D-7 Caterpillar Tractors with Angle Dozer Blades.
1—1942, 2 yd. 87 Lorain Shovel Diesel powered with Fluid Drive
2—1941 Lorain 40 Back Hoes.
1—1941 Lorain Shovel. (40)
2—1941 10 Ton Buffalo Springfield Rollers Caterpillar Motors.

This equipment has been recently put in first class condition. Rentals subject to OPA regulations for not less than ninety days.

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Complete New Wash Sand Plant
Consisting of
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1—Type "S" 4′ x 10′ Double Deck Seco Vibrating Screen with 5 H. P. Motor
1—8″ (Morris) Type F, R. H. Horizontal Bottom disc manganese heavy duty pump
1—Model #CA-401-30KW 4 cylinder Cummins Diesel Generator
1—Panel Board and mountings for gen.

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1—1¼ yd. Byers Gas
1—1¾ yd. Model 8 Northwest
1—1½ yd. Model 6 Northwest Shovel
1—¾ yd. Model 400 P&H shovel and Crane
1—½ yd. Model 16-B Bucyrus Erie Shovel
1—½ yd. Model 30 Bay City shovel
1—80 H.P. High Pressure Firebox Boiler
1—90 H.P. Scotch Marine Dry back
1—400 Amp. Hansen Portable Gas Welder
1—30 Caterpillar tractor, LaPlant Bulldozer
1—40 Caterpillar Diesel W. G. Tractor
1—Model M, Allis Chalmers Hough Loader
1—½ yd. Model 25 Bay City shovel front
1—½ yd. Model 2 Northwest shovel front
1—301 Koehring shovel front (cheap)
4—#2, 1—#1, 1—#400 Vulcan Hammers & Extractors
2—#7, 1—#6, 1—#5, 1—#9B3 McKiernan Terry
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1—10 KW Gas engine, General for Magnet
1—15"x10" Gardner Single cyl. Compressor
1—9"x8" Chi. Pneu. Tool s/c compressor
1—240' Gardner Portable gas. pneumatic tires
1—445' Worthington 2 stage, electric-skidded
1—750' Sullivan Angle Compound electric, Texrope drive
1—1050' Sullivan Angle Compound DC Fairbanks Morse Diesel Engine
1—120 H.P. 4 cyl. Waukesha gas. Power Unit
1—175 H.P. 8 cyl. LeRoi gas Power Unit
2—20 H.P. Clyde 2 drum gas Hoist
1—60 H.P. American D/D gas Hoist
1—100 H.P. American D/D High speed electric
1—10"x12" Lidgerwood 3/D Steam with boiler
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1—30 Ton Ohio Gas. Loco Crane, 50' boom
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MILWAUKEE 4, WISCONSIN

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1—1500 CFM Ingersoll Rand XPV Compound Steam Driven Compressor 100# Air Pressure, 150# Steam Pressure. Excellent condition.

FS-60, Engineering News-Record
330 W. 42nd St., New York 18, N. Y.

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PRACTICALLY NEW
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Model 362 Marion dragline, crane and clamshell combination. Caterpillar D-13000 diesel engine. 60' boom. Finest possible condition.

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HAZELTON, PA.
Telephone 3906

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3—210' Ingersoll-Rand compressors, single stage, portable, gasoline driven, mounted on contractor type wheels.

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1—30-ton capac. guy derrick, 100' boom.
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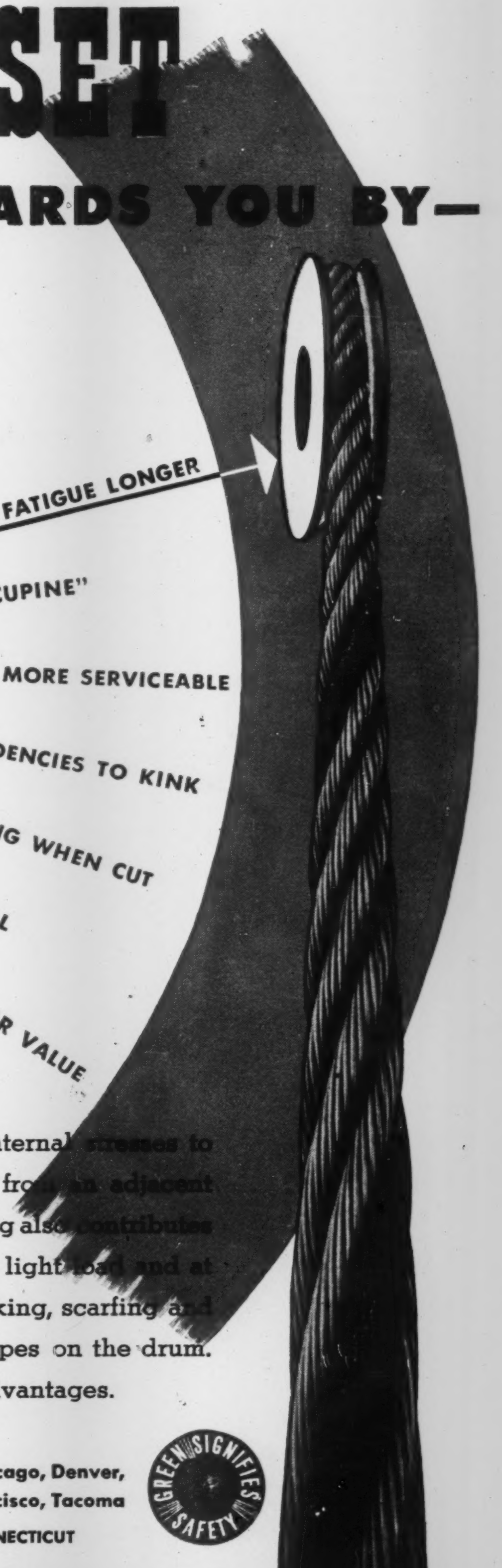
HAZARD LAY·SET

Preformed REWARDS YOU BY—



One of these invariably justifies its specification

1. LASTING LONGER
2. BEING SAFER TO HANDLE
3. SPOOLING BETTER
4. RESISTING BENDING FATIGUE LONGER
5. REFUSING TO "PORCUPINE"
6. MAKING LANG-LAY MORE SERVICEABLE
7. BEING FREE OF TENDENCIES TO KINK
8. REQUIRING NO SEIZING WHEN CUT
9. BEING FASTER TO INSTALL
10. GIVING YOU GREATER DOLLAR VALUE

In Hazard **LAY-SET** Preformed wire rope there are no internal stresses to cause the rope on a drum to climb over or roll away from an adjacent wrap of rope. The resistance that **LAY-SET** has to whipping also contributes to good spooling. **LAY-SET** spools uniformly even under light load and at high speed. This increases its life by avoiding the nicking, scarfing and crushing that take such a severe toll of many wire ropes on the drum. Specify Hazard **LAY-SET** Preformed for all its built-in advantages.

HAZARD WIRE ROPE DIVISION Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Fort Worth, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Tacoma

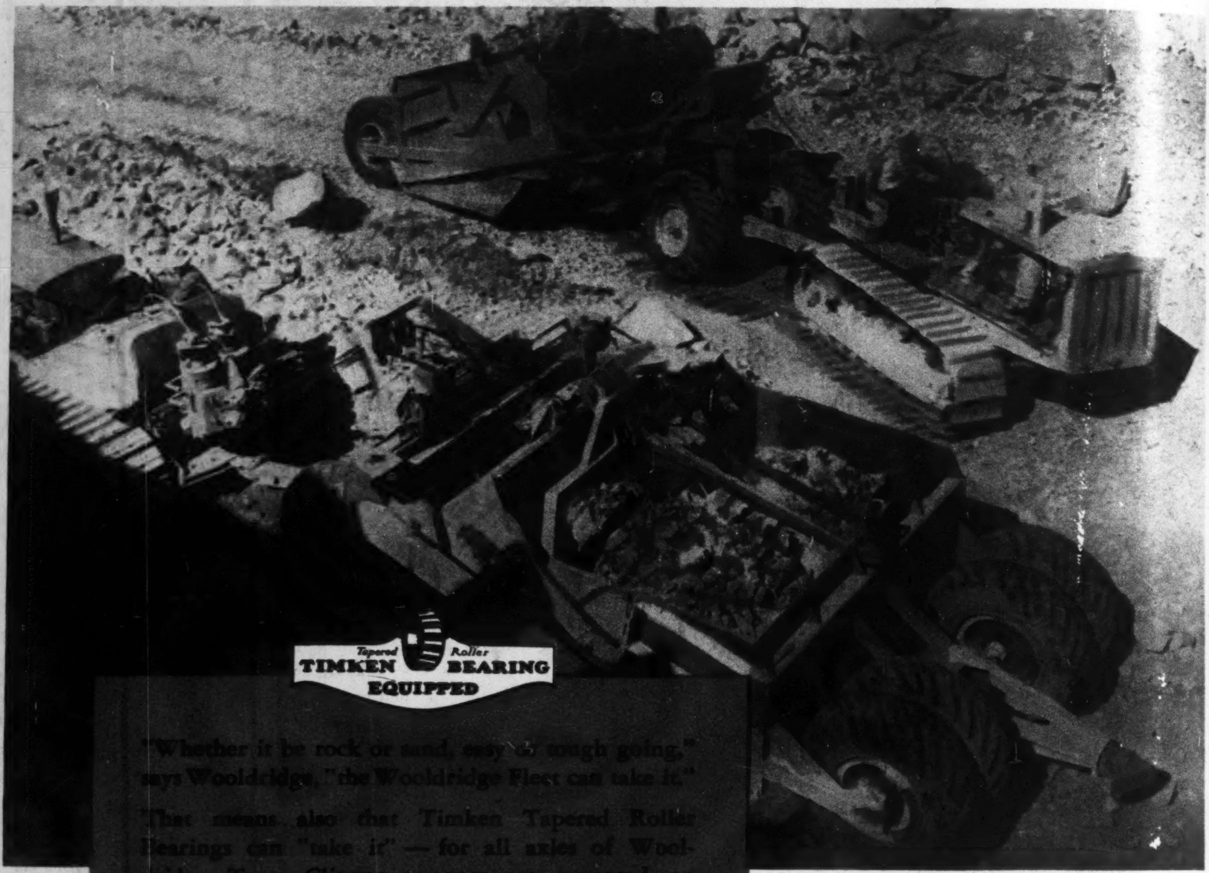
AMERICAN CHAIN & CABLE COMPANY, Inc., BRIDGEPORT, CONNECTICUT

GREEN SIGNIFIES SAFETY

HAZARD LAY·SET WIRE ROPE

Loads ON TIMKEN BEARINGS

are *Loads* off the Contractor's mind



Tapered TIMKEN *Roller* BEARING EQUIPPED

"Whether it be rock or sand, easy or tough going," says Wooldridge, "the Wooldridge Fleet can take it."

That means also that Timken Tapered Roller Bearings can "take it" — for all axles of Wooldridge Terra Clipper scrapers are mounted on Timken Bearings.

Shown in the photograph are two of a fleet of eight 20-yard Wooldridge Terra Clipper Scrapers operated by Utah Construction Company at Ketchum, Idaho. The scrapers are hauled by "Caterpillar" Diesel Tractors (Timken Bearing Equipped) and controlled by Wooldridge Power Control Units in which also Timken Bearings are used.

Timken Bearings improve the operation and increase the endurance of all kinds of construction equipment because they eliminate frictional drag; prevent wear; carry radial, thrust and combined loads; and hold moving parts in correct and constant alignment.

The more Timken Bearings there are in your machines the greater the advantages receivable. Make sure you have them at every suitable position. The Timken Roller Bearing Company, Canton 6, Ohio.

Step up machine performance to meet post-war competition; redesign now, using more Timken Bearings.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS